THE NOVA SCOTIA MEDICAL BULLETIN

Pooling Our Resources

We can be proud of the medical talent in Nova Scotia, and it is over a hundred years since our *Bulletin* first published original papers. This month we have a veritable galaxy of contributions ranging from urgent admoninitions to improve our management of emergencies, to the original investigations of the bacteriological colonisation of the newborn.

By remarkable cooperation representatives of the teaching hospitals have gained agreement on measures that can be instituted to utilize facilities in the Metro area to best advantage for all. Their recommendations are contained in a document that is now being scrutinized by the Minister of Health. We recognize the enormous difficulties that confront the Hon. Maynard MacAskill but welcomes his stalwart attitude to the task and we are honoured by his contribution to our *Bulletin.*

Dr. Imrie has instituted practical courses for cardio-pulmonary resucitation, and every practicing doctor should be familar with the simple technique. Numerous paramedics must be trained to apply it without delay when necessary and this will save many lives.

Thanks to changes in Canadian law, abortions are rarely performed in backrooms by unqualified personnel. Dr. Robinson's contribution shows clearly the present situation and with Dr. Brodie, emphasises the potential dangers of mid-trimester abortions. There is no place for delay once the decision has been made. Migraine plagues many people, and Dr. Murray's article will assist many physicians and their patients. They will also find the Migraine Foundation of great assistance.

Bacteriology continues to be a fascinating and important aspect of medicine and Dr. van Rooyen has written an editorial on listeriosis. This organism was isolated by MacDonald et al who report the results of their work on the bacterial colonisation of babies. In their outstanding paper, they describe the incidence of bacterial colonisations of babies after birth. Whereas over 50% of infants born per vaginam grew organisms one hour after birth, only 17% of Caesarian babies were colonised. In the intriguing process of bacterial colonisation of the infant, the authors felt that environmental flora did not play a significant role.

A warning goes out to all physicians to note the presence of penicillinase-producing gonococci. A similar article appeared recently in the *Lancet,* also emphasizing how vital it is that tests for penicillin sensitivity should be undertaken.

Two contributions from Kentville are presented by husband and wife. First, tuberculosis, which we must not forget. Dr. Holden's review of chemotherapy will prove very helpful and is to be followed in a subsequent issue by her experience in 100 cases. Secondly, Dr. Quinlan's report on mesothelioma is particularly interesting because of the association with asbestos. Apparently smoking and asbestos are mutually synergistic.

Tuberculosis remains an important disease, and its interesting to hear that a delegation of orthopaedic surgeons are producing a display at the American Academy of Orthopaedic Surgeons in Las Vegas and are reported to be taking a full scale impression of an Egyptian mummy which had suffered in life from this ancient disease.

It is encouraging that at last a measure of agreement is being made by Dalhousie University and the Metro hospitals. It is hoped that the Council of Teaching Hospitals can lay a foundation for truly co-operative medicine in Nova Scotia. □

B.J.S.G.

Hon. Maynard MacAskill Talks to the Bulletin

The upward thrust of spiralling costs coupled with gloomy economic forecasts for 1977 could, according to Nova Scotia Health Minister Maynard MacAskill, M.D., call for some hard and not necessarily politically popular decisions. The 38-year old Breton Cove native and former Neil's Harbour general practicioner took over the province's top health administration post in October of last year and has inherited not only the largest budget of any provincial department but also the multitude of problems which go with it.

A 1967 graduate of Halifax's Dalhousie Medical School, Dr. MacAskill also holds a University of Alberta master's degree in health services administration — a useful tool in a job where administrative efficiencies must somehow blend with the demands of society's most personal and often most urgent needs.

Dr. MacAskill has no illusions about the challenge he faces.

"There's no doubt about it; our disease-oriented health care system is simply costing too much. Right now we have no choice but to pay the price. In the long run, though, we have to face facts. The demands of the system are outstripping our ability to meet the costs.

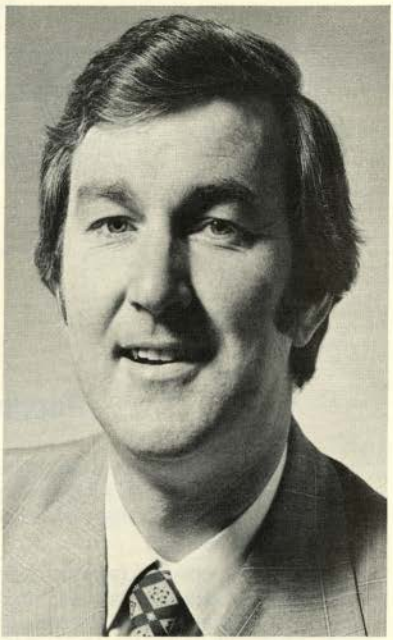
"Paradoxically, though, we're going to have to put more public dollars into alternative health delivery approaches in order to cut long term costs or at least to hold a reasonable line without sacrificing the present quality of care.

"I think I should make it clear, too, that when I talk about an alternative approach in any sector of the health care field I mean an alternative which, for instance, would allow us to close out some of our extremely expensive hospital beds. An alternative which is simply added to the present system is not to my mind a true alternative. It's just an added expense."

He cites the home care experiment in the Digby area. "It's a pilot project, of course, but I think it's working out pretty well. You know, in many instances home care is going to have to replace hospital care. Hospitalization has to be based on individual degrees of need and where those needs do not exist relatively inexpensive home care can replace costly in-hospital care. The way things are now, our health care costs are increasing significantly faster than the G.N.P. Predictions for 1978 are that federal health care spending — that's just the federal costs — will hit the eight billion dollar mark. What it boils down to is this: Faced with demands for increased services or for maintaining increasingly costly services which could be replaced by cheaper and equally effective services, politicians have only two choices — either say 'No', or raise taxes."

As the old saying goes, however, an ounce of prevention . . . and Dr. MacAskill is convinced that a turn-around in lifestyles can go a long way toward cost-cutting while at the same time releasing currently committed funds for application to greater social and economic effect.

To his mind, for instance, smoking is as much of an enemy of health care budgets as it is of the human lungs and cardiovascular system. He's not convinced, though, that expounding on the habit's medical perils will do much to curb the incidence of smoking-related diseases.



"There are really only two ways we can cut down on smoking. The first is by regulation — which is never very popular — and the second is through public information programs that make smoking socially unacceptable. This is the approach that's being tried now, and I think with some success. Again, however, public education is an expensive process."

But cigarettes aren't the only hazard facing the public health and the public purse. Ignorance about personal health care along with several other self-inflictable maladies are also factors to be considered.

Although many adults are now and probably will remain committed to the inhalation of tobacco tars, the occasional — or frequent — abuse of alcohol and to a certain indifference to other controllable health hazards — all of which have a collective impact on the health budget — there is one sector of society which is not only receptive to new information but which already exists in an education environment — the young.

"Right now we're looking at an educational program — a very limited program I should add — for this year. It's limited because funds are limited and, quite frankly, it hasn't been approved yet. It's basically an educational effort with a lifestyle emphasis and if we can get it going there are several things we'd like to try; things in the fields of smoking, drug and alcohol abuse and in general health awareness."

However, whether effective cost-cutting can be achieved through public education or by tough mindedness on the part of those who control the health dollar — or by a mixture of both — things still look uncertain and the Minister doesn't see the immediate future as particularly encouraging.

"In the end it will depend on the uncertain financial implications of the new federal-provincial agreement. The hard truth is that, with a limited tax base, it is unlikely that the Atlantic provinces will be able to maintain health services comparable to those of the other provinces. We just don't have the money."

Still, there is one area in which Dr. MacAskill feels health care costs can be cut almost immediately and somewhat dramatically. A strong advocate of seatbealt legislation, he's after final legislative action. "I want to see our compulsory seatbealt legislation proclaimed while I'm Minister of Health. This isn't just a pious hope on my part; it's an expression of intent.

"Did you know that during the fiscal year 1974-75 the cost to Nova Scotia taxpayers of injuries resulting from highway accidents was three million dollars? Those were just the medical costs. They didn't include the social costs — the loss of jobs and productivity, the costs of litigation, welfare and other assistance payments and a host of other expenses which had to come out of the taxpayer's pocket.

"I know that there is opposition to this legislation; there has been in just about every jurisdiction where it has been introduced. In fact, survey after survey has shown that seatbelt laws almost invariably meet immediate resistance. But after introductory legislation there is rapid acceptance. I'm an advocate, a strong advocate of seatbelt legislation and I want to see it proclaimed in Nova Scotia."

While seatbelt legislation is geared to protect the public, many feel that there are other areas of government-initiated action which pose as great a threat to the public good as any health hazard you may care to name. Aerial spraying programs against the spruce budworm serve as a popular — or unpopular — example.

"The whole problem with these chemicals — with any chemicals, in fact — is that we don't know enough about their effects. I think that even the possibility that there may be a connection between Reyes syndrome and spraying programs is a warning, a very serious warning. My real concern is about the role governments play in this general area. Involved government agencies seem to approve and re-approve herbicides and pesticides as a matter of routine. In my opinion, it's not enough that pesticide manufacturers say their product is safe because there is no documented evidence of adverse side effects. Statements like that are meaningless. Chemical agents should not be classified as safe simply because there are no immediate and alarming indications to the contrary. In fact when you consider how little we do know about these things, we should probably consider all chemicals destined for broadcast use as unsafe."

On the other side of the coin though, while some may feel that government adopts an overly laissez-faire attitude in some cases others are just as worried about real or imagined government intrusions into the individual's work life.

Experienced as a practising physician, the Minister feels government involvement in the actual delivery of health care should stop short of the examining room door. "I think doctors should understand that the government is not leaning over each physician's shoulder as he or she deals with his or her patients. Because we provide the funding, we naturally have a very real interest in how the money is spent, but not to the extent that we dictate the rules of professional practice. Government's job is to provide the best health care possible with the funds available and to ensure that the public is protected in receipt of that care." □

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Ascaris Lumbricoides Prevalence

REQUEST FOR INFORMATION

We are investigating the prevalence and modes of spread of *Ascaris lumbricoides* in various areas of Nova Scotia (under a National Health Grant) and would appreciate hearing from physicians who identify such infections in individual patients or know of areas with a number of cases. This round worm which measures 6-12 inches in length, is unsegmented and tapered at both ends so that it is readily recognized by patients, and commonly treated by physicians without confirming the diagnosis by stool examination. We should like to urge physicians to send stools in to us for laboratory confirmation of the infection (the eggs of the worm are readily found in stool specimens) before they treat their patients or other family members. We are particularly interested in hearing about infected patients living in urban areas, because the mode of spread of such infections is not clearly defined — one possibility is contamination of fresh vegetables by embryonated eggs.

The life cycle of this round worm is unique because the eggs must mature in soil before they become infective. Thus it is very unlikely that the infection can be spread directly from an infected person (i.e. by fecal contaminated hands) to another person. The infected feces must be deposited on soil and mature in the soil for two or three weeks, before the eggs become capable of hatching when swallowed.

Ascariasis is usually considered to be a tropical or subtropical infection but our preliminary results of the prevalence of this infection in several communities in Nova Scotia reveal that from 0 to 33% of the people tested are infected.

We would be pleased to hear about any infections with this worm by writing or telephoning one of the undersigned.

Feces or worms may be sent in a container with a tightly fitting lid to:

Dr. Juan A. Embil,
Infections Diseases Research Unit,
I.W.K. Children's Hospital, Halifax, N.S.
Telephone 424-6158

or

Dr. F. Russell Manuel,
Department of Preventive Medicine,
Dalhousie University, Halifax, N.S.
Telephone 424-3860

"Emergency!" — Nova Scotia?

D.D. Imrie,* M.B., F.R.C.P.(C),
Halifax, N.S.

The stars from televisions exciting series, "Emergency".

The television programme "Emergency!" which deals with the work of Los Angeles Fire Department Paramedics, is among the most popular shows broadcast. However, many physicians are unhappy over what are regarded as impossibly high standards of practice portrayed in other medical programmes such as "Marcus Welby M.D." and "Medical Centre", and regard "Emergency!" as largely fictitious.

In fact, paramedic rescue squads like those depicted in "Emergency!" are already a reality in the United States. Cities such as Los Angeles, Seattle, Phoenix, and Albuquerque, have had programmes for several years and many states now require some paramedic training for *all* firemen, policemen and ambulance attendants. Such personnel are designated "Emergency Medical Technician" (E.M.T.). While these programmes are expensive and no large scale move in this direction is apparent yet in Nova Scotia or indeed in Canada generally, it seems likely that some trend to providing similar services will take place. The drive for this development is derived from recent reviews of trauma and heart attack statistics, which have emphasised that on the scene resuscitation and stabilisation prior to transportation considerably improve survival.

In the management of cardiac arrest emergencies, whether caused by heart attack, electrocution, trauma or anaphyllaxis, still greater success is reported from areas where a second tier of emergency support has been made available. In Seattle this is known as Medic II (The Fire Department Paramedic Service is called Medic I), and consists of 120-150,000 members of the general public who have been trained in cardiopulmonary resuscitation (C.P.R.) to a Basic Life Support level. This volunteer force is so large in proportion to the city population that it almost guarantees that a rescuer will be immediately available anywhere in the city. The volunteer force is continually enlarged by volunteer efforts and by compulsory training in C.P.R. in some Seattle high schools.

Some small efforts have begun along these lines in the Halifax-Dartmouth area. Courses in C.P.R. have been given to the ambulance personnel and nursing staff at the Victoria General Hospital, and to the Halifax Fire Department (on a purely volunteer basis so far); and to the life guards of the Recreation Department beach patrol through the Red Cross water-safety programme. Many requests for the C.P.R. Training have been received from widely disparate groups.

What does this all mean to the physician in Nova Scotia? It may mean only that he may see more sophisticated resuscitation in First-Aid situations, or that victims may be brought to him in the emergency department attended by lay personnel who have applied these critical but simple life-saving techniques in the field.

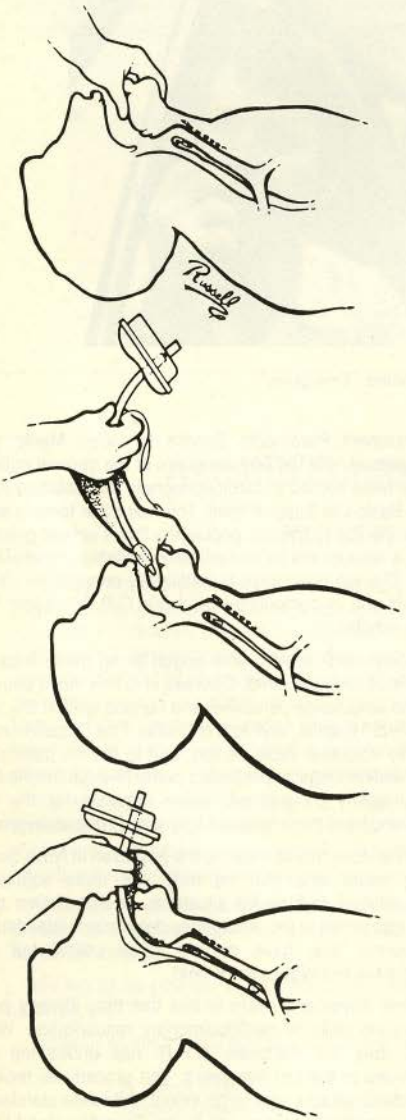
Most physicians seem to feel that they already possess adequate skills in cardiopulmonary resuscitation. *We suspect they are mistaken.* C.P.R. has undergone radical revisions in the last five years. The procedures have been standardised to a very large extent and these standards are now accepted Canada-wide by the Canadian Heart Foundation, the Red Cross Societies, and the St. John Ambulance.

*Assistant Professor, Department of Anaethesia, Victoria General Hospital, Halifax, N.S.

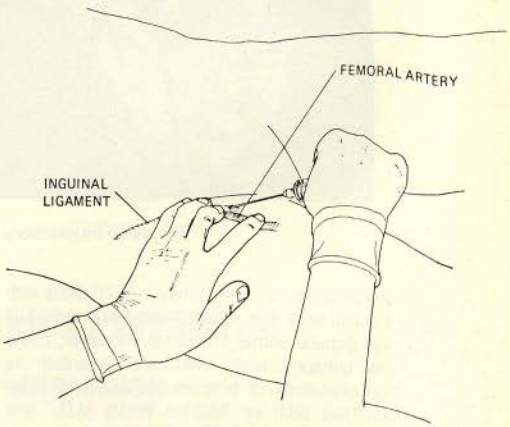
The standards, which were prepared by the American Heart Association's Committee on Cardiopulmonary Resuscitation and Emergency Cardiac Care, are published in detail in a slim, easily read pamphlet as a special supplement to the Journal of the American Medical Association. This pamphlet is available from the Nova Scotia Heart Foundation. Every member of the Medical Society of Nova Scotia is strongly encouraged to become thoroughly familiar with the standards and is invited to seek training through the Heart Foundation, and then to teach these standards whenever requested to provide instruction in cardiopulmonary resuscitation.

The management of cardiac arrest is broken down into two phases. Phase One, Basic Life Support, requires no equipment or drugs and can be performed by one person unassisted. Basic life support consists of expired air ventilation (mouth-to-mouth or mouth-to-nose) and closed chest cardiac massage. The skills necessary for the successful use of these techniques require practice for proper coordinated application. Several hours of practice with a life-size training mannikin are usually required for proficiency, and annual or semi-annual retraining is required for the maintenance of those skills. C.P.R. of infants and the management of the obstructed airway are included in a course leading to certification by the Heart Foundation of proficiency in basic life support.

INSERTION OF ESOPHAGEAL AIRWAY



TECHNIQUE FOR FEMORAL VEIN



1. Cleanse the overlying skin with povidone-iodine; this is especially important in this site because the danger of contamination is great. If the puncture is being performed electively, shave the hair around the area.
2. Locate the femoral artery either by its pulsation or by finding the midpoint of a line drawn between the anterior superior iliac spine and the symphysis pubis.
3. Infiltrate the skin with lidocaine if the patient is awake.
4. Make the puncture with the needle attached to a 5 or 10 millifiter syringe two finger breadths below the inguiral ligament, medial to the artery, directing the needle cephalad at a 45 degree angle with the skin or frontal plane (some prefer to enter at a 90 degree angle) until the needle will go no further.
5. Maintain suction on the syringe and pull the needle back slowly until blood appears in the syringe, indicating that the lumen of the vein has been entered.
6. Remove the syringe and insert catheter with the needle more parallel to the frontal plane.
7. Withdraw the needle, leaving the catheter in place.

Advanced life support is intended to be applied by physicians, nurses and trained paramedic staff. It is intended for use at the scene of cardiac arrest to stabilise the condition of the victim/patient prior to transport to a hospital and for use in hospital by the staff. Advanced life support involves more sophisticated support for the respiratory and cardiovascular systems and management of the disturbances produced in other body systems.

The respiratory system is stabilised initially by bag and mask ventilation ("Ambu" bag or "Hope resuscitator"), and later an oesophageal obturator airway or endotracheal tube may be inserted. Oxygen at high F_IO_2 can then be administered by manual intermittent positive pressure ventilation or automatic ventilator. If continued massage is required, a gas-driven mechanical intermittent sternal compressor can be positioned to maintain circulation during transit. Intravenous infusion of dextrose and sodium bicarbonate may be necessary to correct metabolic disturbances, and to provide a route of administration for appropriate drug treatment of arrhythmias and for analgesics, sedatives and anti-shock steroids. The presence of arrhythmias may require the injection of lidocaine, procaine amide, propranolol or other β-adrenergic blockers, atropine, isoproterenol, dopamine, epinephrine, norepinephrine, etc., etc. Early electrocardiographic monitoring is mandatory and direct current counter-shock may be required several times to correct undesirable rhythms.

TECHNIQUE FOR INTERNAL JUGULAR VENIPUNCTURE: ANTERIOR APPROACH

1. Place the left index and middle fingers (if from the right side) 3 centimeters lateral to the midsternal line; the carotid artery is retracted medially away from the anterior border of the sternomastoid.
2. Introduce the needle at the midpoint of this anterior border (5 centimeters above the clavicle and 5 centimeters below the angle of the mandible).
3. Forming a posterior angle of 30 to 45 degrees with the frontal plane, direct the needle caudally toward the ipsilateral nipple and toward the junction of the middle and medial thirds of the clavicle.

The above is not intended as a complete list of procedures or drugs used in this advanced life support phase and, hopefully, is largely familiar to most physicians. The point is that all of the above techniques and managements have been used by trained paramedics under radio-supervision by critical-care physicians. It may become commonplace in Nova Scotia sooner than you think.

At the recent convention of the American Heart Association, evidence was presented which strongly suggests that resuscitation begun by trained bystanders within one minute of cardiac arrest can have a long-term survival (to leave hospital i.e. 3-4 weeks at least) of 40% or better. If the victim has to wait the 3-5 minutes for a paramedic rescue squad, the survival is only 18-20%. These are patients who currently *all* die in Nova Scotia.

An unpublished but very real problem is becoming apparent in the United states. In some instances resuscitative measures, successfully applied by lay rescuers or professional paramedic teams, have been undone or inefficiently taken over by medical personnel who were unfamiliar with these relatively new techniques. In some areas, this has been common enough to present a serious morale problem to the Paramedic Teams, and it appears likely that it occurs because of lack of a coordinated upgrading of resuscitative skills in physician population *prior* to the extensive introduction of paramedic or lay rescuer programmes.

It seems that such programmes are worthwhile, but much public education and training will be required before their introduction. We believe the professionals *must* be made ready. Are You Ready? Become familiar with the New Canadian Standards for C.P.R. & E.C.C. Train your staff to these standards. Remember, the life they save may be *Yours!*. □

Acknowledgements

With thanks to the Atlantic Television System station CJCH for photograph and the American Heart Association for figures extracted from the text entitled Advanced Cardiac Life Support published by the Committee on Emergency Cardiac Care.

Complications and Maternal Effects of Therapeutic Abortions

Victoria General Hospital, Halifax, N.S. — 1974

S. C. Robinson,* M.D., F.R.C.S.(C),
Halifax, N.S.

The purpose of this paper is to give information on who undergoes therapeutic abortions, what methods are used, what effect therapeutic abortion has on the female person, and what complications occur. The implications of therapeutic abortion vary greatly according to the type of society, cultural conditioning, and health facilities.

We studied all therapeutic abortions in Halifax during the year of 1974 and contrasted this information with a previous study from the same city covering the years 1970 and 1971.[1] These years, shortly after the law respecting therapeutic abortion was altered in Canada, represent our early experience with the procedure while the present report is representative of our current experience. For various reasons, all therapeutic abortions in Halifax take place in the Victoria General Hospital which is a large referral centre owned by the provincial government. None occur in the Halifax Infirmary which is a community and regional hospital also owned by the provincial government, or in the Grace Maternity Hospital, or the Izaak Walton Killam Hospital for Children.

All therapeutic abortions were approved by the Therapeutic Abortion Committee for medical indications including surgical, medical, psychiatric, or psycho-social illness. Normally, this hospital requires the written certification of two physicians before the Committee considers the case. No case is approved unless the physicians state as their opinion that the health or life of the mother is in jeopardy by reason of the pregnancy. The general guidelines used have been described by David[2] and apart from severe medical or surgical conditions, include a group of rather firm psychiatric indications and another group which in general require careful history taking and interpretation. After reading the documentation relating to the therapeutic abortion cases in 1974, one cannot help but be impressed with the considerable care taken in this difficult decision making. In the majority of cases, such factors as immaturity, insecurity, family turmoil, parental alcoholism, or parental rejection had resulted in low self-esteem and unsatisfactory techniques for facing social and inter-personal challenges. For these people their emotional or mental health was already in jeopardy. The pregnancy would likely make it worse.

In 1974, 620 terminations were completed — an increase of 4% over 1973.** During the same period, a total of 958 terminations occurred in the Province of Nova Scotia, giving a therapeutic abortion rate of 7.3% (of 13,172 live births).

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**Very little annual change has occurred since 1974.

AGE, MARITAL AND RELIGIOUS STATUS AND PREVIOUS PREGNANCY HISTORY

In the 1970/71 study, 28% of the women having therapeutic termination were under 20 years of age whereas 40% were in the next decade of life. Unfortunately, we did not tabulate age figures for the 1974 study but our guess is that there may be a small shift to the younger age group. In both study periods, about 1/3 of the women were married. Information for 1974 reports that 42.3% were Roman Catholic and the balance were Protestant or some other religion, with a few reporting no religion. For 1974, we have information on previous pregnancy experience.

Forty-three percent in 1974 had had no previous pregnancy; 40% had had a delivery; 8.2% had had a previous spontaneous abortion (miscarriage); and 8.8% a previous therapeutic abortion. This information is summarized in Table I.

TABLE I

COMPARISON OF 1970/71 AND 1974 STUDIES

	1970-71	1974
Married	34%	30%
Other	66%	70%
Roman Catholic	—	42.3%
Protestant or other	—	54.7%
Previous terapeutic abortion	—	8.8%
Miscarriage (spontaneous abortion)	—	8.2%
Previous delivery	—	40%
No previous pregnancy	—	43%
Age:		
< 21	33%	—
21-30	42%	—
31-40	19.9%	—
> 40	4.9%	—

PREVIOUS CONTRACEPTION

We have no information for 1970/71, but for 1974, 82.4% of the women indicated that they had satisfactory contraceptive information yet the pregnancy was attributed to contraceptive failure in only 31.4% of instances. The specific contraceptive means which failed are listed at the end of Table II. Grauer's report from Montreal in 1974,[3] concludes that a previous abortion does not motivate patients to adopt a more effective method of birth control. He points out that patients presenting for a second or third abortion have a higher instance of chronic psychiatric disorder as compared with a control group of women who have had only one abortion. A study of our case histories seems to confirm the

TABLE II

CONTRACEPTIVE DATA — 1974 THERAPEUTIC ABORTION (620 CASES)

Previous contraceptive information		Yes 82.4% No 17.6%
Contraceptive failure		Yes 31.4% No 68.6%
Failures using:	Condom	42
	Foam or diaphragm	34
	Rhythm	32
	I.U.D.	31
	Pill	28
	Vasectomy	2
	Tubal ligation	2
	Astrology	1

latter statement but not the former, otherwise our instance of repeat therapeutic terminations would, one would suspect, be higher.

TECHNIQUE OF THERAPEUTIC ABORTION

At the Victoria General Hospital, therapeutic abortions are carried out by the vacuum extraction method up to 12 weeks. Virtually no abortions are done between 12 and 16 weeks of pregnancy whereas between 16 and 18 weeks, terminations are carried out by the intra-amniotic saline or prostaglandin method. During the year 1974, all the mid-trimester terminations were carried out by saline with one exception. During the second study period, 1974, hysterotomy and hysterectomy were rarely used for therapeutic termination. These data are summarized in Table III. During 1974, laminaria digitata came into general use to facilitate first trimester abortion. Usually, a small-size laminaria was inserted into the cervix 12 to 24 hours before the abortion using careful, aseptic precautions. This technique has been a tremendous advance and has practically eliminated cervical tearing in early abortion.

TABLE III

TECHNIQUE OF THERAPEUTIC ABORTION

	1970-71	1974
Vacuum	73%	68%
Saline	12%	31%
Hysterotomy	2.2%	< 0.2%
Hysterectomy	9.5%	< 0.4%

SURGICAL COMPLICATIONS WITH THERAPEUTIC ABORTION

In the early study, we cannot identify each complication in relation to each type of procedure in all instances. For the recent study, the information in Table IV is separated out and contrasted with the previous study. In Table V, we have listed a D&C following saline termination as an additional procedure but not necessarily a complication. The indications for D&C after saline termination appeared to vary from clinician to clinician and the overall trend during the year was definitely to use D&C less frequently. Because virtually all of the vacuum aspirations were carried out on out-patients and even the saline termination patients left hospital within a day or two of the procedure, the information in Table IV relates to early surgical complications. There were no maternal deaths in either series.

TABLE IV

EARLY COMPLICATIONS OF THERAPEUTIC ABORTION

	1970-71 (all cases)	1974	
		Saline	Vacuum
Infection	4 %	4 %	0.7%
Bleeding	2.3%	2 %	0.5%
Perforation	0.8%	—	0.7%
Deep vein thrombosis	—	0.5%	—

Table IV lists the total complications for both studies as percentages of vacuum extraction or saline procedures. The great reduction of complication in vacuum extraction procedures is, of course, gratifying. Table V indicates the additional D&C procedures required in the two groups in 1974. Lest we underestimate the risk of therapeutic abortion, the reader is referred to the study of Brodie[10] in which complications of saline termination occurring in 1975 in the same institution, are described.

TABLE V

ADDITIONAL PROCEDURES

1974	Vacuum	Saline
D&C for retained products	0.7%	30%

LATE EFFECTS OF THERAPEUTIC TERMINATION

At the time of the 1974 study, we asked each patient to return a questionnaire six weeks after the abortion, and we provided a careful explanation and stamped, addressed envelopes. Returns were unsigned and we were gratified to have an 80% reply rate.

The results of this questionnaire survey giving follow-up information at six weeks is provided in Table VI. Only 14.7%

TABLE VI

PATIENT'S QUESTIONNAIRE

(Completed at six weeks and returned.)

1.	Did you have any of the following:	
	(a) bleeding requiring treatment	Yes 6.7%
	(b) pain after one week, requiring treatment	Yes 7%
	(c) emotional or mental disturbance	Yes 14.7%
	If yes, was treatment required?	Yes 32%
2.	Did you wish contraceptive (birth control) advice?	Yes 62%
	If yes, did you receive advice?	Yes 96%
3.	Are you presently using contraception (birth control)?	Yes 72%
	If yes, what?	

pill	301
IUD	19
vasectomy	13
hysterectomy	3
tubal ligation	11
diaphragm	3
suppositories, etc.	2
condom	2
rhythm	2

of patients replying stated that they had emotional or mental disturbance following the abortion procedure; 3.2% of the total stated that treatment was required. In order to secure maximum response, we did not ask for details and these replies are purely the patient's own judgement. By contrast, MacKenzie reports from Kingston, Ontario[4] that 41% expressed guilt and 40% commented on depression after an abortion. It is not stated how much overlap there is in these two groups. In our questionnaire, we also sought information concerning further contraceptive planning and 62% admitted to desiring additional contraceptive advice; of these, 96% received the advice presumably from their physician, a nurse or other counsellor.

PHYSICIANS FOLLOW-UP REPORTS

All the patients were asked to see their physicians at about six weeks after the abortion, and each was given a questionnaire sheet to take to her physician. This included a covering letter and the physician was asked to complete the form and return it in the stamped, addressed envelope at the time of the six week check-up. In this case, the reply rate was 73% and the information is shown in Table VII. This questionnaire was quite simple and direct, and very few abnormalities were revealed. This information is in keeping with that of MacKenzie.[4]

TABLE VII

PHYSICIANS QUESTIONNAIRE

(Completed and returned at six weeks)

1.	Did the patient have any complications?	Yes 12%
	D&C 3%	
	bleeding 1.5%	
	other — unspecified or misc. 9.5%	
2.	Patient's hemoglobin at 6 weeks	< 10 gm.% - 1.7%
		10-11 gm.% - 5.6%
		> 11 gm.% -92.7%
3.	Was the pelvic examination normal?	Yes 95%

CONCURRENT STERILIZATION

In 13 cases of vacuum abortion, concurrent (post-abortion) vaginal tubal ligation was attempted. In 12 cases the procedure was totally uneventful and uncomplicated but in one instance, the procedure could not be carried out and an abdominal tubal ligation was carried out at a later date. Recently there has been additional corroborative evidence indicating that concurrent sterilization is a safe and satisfactory procedure in selected cases.[5]

SIGNIFICANCE OF THERAPEUTIC ABORTION AND EARLY PREGNANCY LOSS

The proportions of spontaneous, "septic", and therapeutic abortious have changed since the new abortion legislation. To study these changes we used the totals for all hospital admissions for spontaneous and "septic" abortion in the city, and contrasted these with the therapeutic abortion totals for the city. Figure 1 shows the changes from 1967 to 1973. Does the decrease in hospitalized, spontaneous and "septic" abortion cases mean that many of these were formerly illegal and now are replaced by legal abortions? At any rate, the fall in "septic" abortion admissions is gratifying and has been maintained.

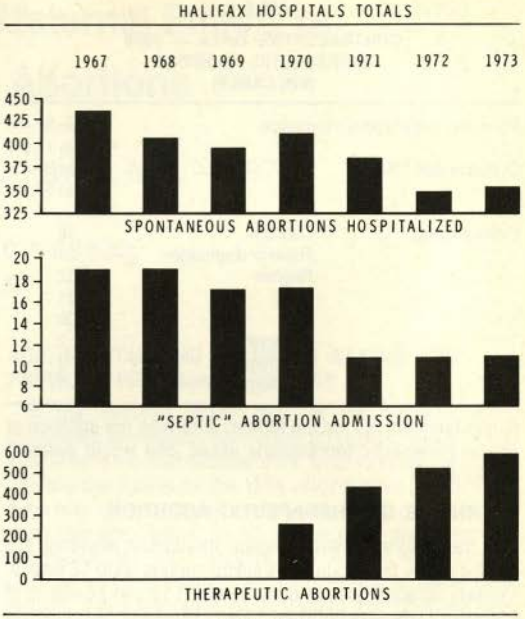

FIGURE 1

PREVENTIVE AND COUNSELLING SERVICES

It has been said that the need for therapeutic termination of pregnancy should be minimal where adequate contraceptive information is available. Clearly from this study, adequate contraceptive information is not enough. Apart from the relatively few cases where pregnancy occurred as a result of the failure of a satisfactory contraceptive method, pregnancy and the need for a therapeutic abortion occurred in situations where the outcome was predictable. The causes go back in the family and personal histories. These problems have been alluded to by MacKenzie[4] and Cowell.[6] Real family life education beginning before people become parents and continuing with parents and children might be of value. The observations of Hunter from Vancouver[7] and especially of Sandburg and Jacobs from Stanford University[8] are relevant but do not give us grounds for much optimism. Despite the fact that our total numbers of therapeutic abortions have not increased greatly, the number of late applications requiring saline termination has not reduced substantially. We have provided guidelines[9] to the medical profession in Nova Scotia in this regard but there has not been a significant improvement in early identification of cases requiring termination.

SUMMARY

Therapeutic termination of pregnancy is requested by a variety of women in various parts of the reproductive age group and includes women with various religious backgrounds (approximately representative of the total population) and also includes women with previous pregnancy experience either by way of successful delivery or, in a few cases, by previous spontaneous or therapeutic abortion. Mercifully, the surgical complications seem to be very few and the emotional impact as reported by the women themselves at six weeks is much less than many have suggested. It may be that a number of former so called

'spontaneous abortions' which were admitted to our hospital were in fact illegal procedures, likely to be complicated by sepsis. (Fig. 1) This risk may well have been diminished by the legalization of abortion under the conditions prescribed by Canadian law. Further preventive programs are clearly very necessary but these must go far beyond simple contraceptive information. □

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The Status of Therapeutic Abortion in Nova Scotia

In 1969, the Criminal Code of Canada was modified to permit therapeutic termination of pregnancy in approved facilities, when the termination had been approved by an established committee under circumstances where failure to terminate would result in jeopardy to the life or health of the mother. As was expected, there has been a rapid increase in the number of therapeutic terminations in Canada, although not nearly so rapidly in Nova Scotia as in many other provinces. What was not uniformly predicted was that the numbers of therapeutic terminations each year would level off after about five years and thereafter remain fairly constant. In Nova Scotia, this has certainly occurred and at the present time the proportion of therapeutic abortions is about 7 percent of the total births in the province.

It is not our position to argue the merits or otherwise of this particular amendment to the Criminal Code but it is important to look at two particular aspects of the situation. The first is whether or not the provisions of the Criminal Code are being applied equally and fairly and uniformly across the province, and indeed across the nation. Since there is considerable evidence that local committees vary a great deal in their interpretation, the Federal Department of Justice established a *Committee on the Application of the Abortion Law*. This committee has recently conducted a cross-country survey to determine whether or not Canadian citizens have equal treatment under the law in respect of therapeutic termination of pregnancy. Their findings should be available in the near future and may provide guidelines to physicians, regional and referral hospitals.

The second matter of real concern is that of safety to the woman undergoing therapeutic termination of pregnancy. Between 1971 and 1974, mid-trimester abortions increased from 12 percent to 31 percent at the Victoria General Hospital. While it is true that in the year 1974 there were no serious complications from mid-trimester termination, these certainly did occur in other years and are documented by Brodie in an article commencing on page 13 of this *Bulletin*. The world over, it is now clearly recognized that therapeutic abortion in the first trimester of pregnancy (particularly in the first 10 weeks) is much safer and less upsetting than mid-trimester termination, which involves labour induced by saline, urea, or prostaglandin, at a time when nature has not prepared the cervix for dilatation.

We cannot control the time at which a patient first makes contact with a physician regarding possible therapeutic abortion. We can, however, as physicians control matters from there on, and it is our duty to ensure that there is no delay caused by a physician or the communications systems we use. Those physicians who do not deal with therapeutic abortion cases ought to advise the patient at once of this fact and suggest that the patient see some other physician. If at all possible, it is a great courtesy as well as common sense to make a suitable referral. If a physician does accept the patient, it is incumbent on the physician to ensure that the necessary consultations, requests to therapeutic abortion committees and referrals for treatment, all take place within a very few days. Provided that a patient makes early contact with a physician, there is no reason — except in the most unusual circumstance — why therapeutic abortions should not all take place before the 10th week. Delays caused by procrastination or by bungling in making arrangements, result in mid-trimester abortion with added risk and trauma and should rarely be necessary.

Maybe it is time that each of us took a look at our practice methods to ensure that we do not cause unnecessary delay and suffering through clumsy decision making and inefficient administration. □

S. C. Robinson, M.D., F.R.C.S.(C).

NO SMOKING

Once again there is a tip-in which may be easily removed for use as a poster in a place of your choice.

The Society's Drug and Alcohol Abuse Committee appreciates your co-operation in the Medical Profession's anti-smoking campaign.

FACILITIES FOR UNMARRIED MOTHERS

BETHANY HOME

The Salvation Army

980 Tower Road, Halifax, N.S.
B3H 2Y4
Telephone — 422-5900

HOME OF THE GUARDIAN ANGEL

Catholic

6345 Coburg Road, Halifax, N.S.
Telephone — 422-7964

Both these Homes offer good residential facilities for unmarried mothers. They also provide counselling, social service assistance, adoption planning and arrangements and other assistance.

PRENATAL CLASSES

Special classes for unmarried mothers are offered in the outpatient department of the Grace Maternity Hospital. Appointments can be made by calling 422-6501 and asking for the Prenatal Clinic.

The Prenatal Clinic is also prepared to offer full maternity care and experienced nurses, a social worker and nutritionist are available for assistance.

Cervical Tears Following Mid-Trimester Saline Abortion

Glenn Brodie,* M.B.,
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Until the end of 1974, severe complications of mid-trimester abortions were infrequent at the Victoria General Hospital. However, in late 1975, three major complications occurred in quick succession and we re-examined our data for this particular group of therapeutic pregnancy terminations. This report constitutes our findings and the results are clear and dramatic. The complications were severe; they were occurring at an alarming rate of 1/100 saline therapeutic terminations and there does not appear to be any single predisposing factor.

One third of the therapeutic abortions performed at the Victoria General Hospital are mid-trimester, consisting of cases referred from anywhere within the province. Since 1970, nearly 1,000 mid-trimester saline terminations have been completed and of these, seven have resulted in lacerations of the cervix.

Apart from 100 mid-trimester cases terminated by prostaglandin intra-amniotic injections during 1973, all the others have been saline terminations. This procedure is carried out between the 16th and 18th week of gestation. A clear flow of amniotic fluid is obtained by transabdominal tap and 200 cc. of 20 percent saline is injected into the amniotic cavity. Subsequently, Oxytocin is used to stimulate labour. This is infused at the rate of 300 to 400 milli-units per minute in a glucose and water intravenous drip and is, of course, 10 to 20 times the dose required to induce labour at term. Sometimes, stimulation has exceeded 30 hours in total, although a daily treatment does not normally exceed 14 hours. Labour is generally tumultuous and painful despite the use of analgesics.

This report does not discuss minor complications, such as, retained products, hematomas, or minor endometritis, and severe infection has been a rare complication. We are concerned with uterine trauma resulting from mid-trimester abortion, particularly lacerations of the cervix. Seven of these have occurred during the past six years and brief summaries of each case are reported.

CASE HISTORIES

Case No. 1

Miss D. S. (age 18, gravida 1, gestation 18 weeks) received hypertonic saline injection with Oxytocin infusion, and aborted in 12 hours. Due to bleeding, she was examined soon after and we discovered a vertical tear of the cervix, associated with a transverse rent, extended from 4 o'clock to 12 o'clock. The cervix was repaired and she was provided with oral contraceptives but, within a year, she suffered a spontaneous abortion at 11 weeks and a D & C was required. A fistula remains on the right side of the cervix but she has not returned for another attempted repair.

Case No. 2

Mrs. M. D. (age 33, gravida 6, para 5) had a saline termination at 18 weeks after 9 hours of labour with Oxytocin infusion. Examination, because of bleeding after the abortion, revealed a mid-line posterior cervical laceration extending to the internal os. This was repaired in layers and healed satisfactorily. This patient subsequently had a hysterectomy because of prolapse and the histology showed normal healing of the cervix.

Case No. 3

Miss P. M. (age 17, gravida 1, 16 weeks gestation) received 200 ml. of saline, went into spontaneous labour and was not given Oxytocin. Her labour was prolonged and delivery occurred at 42 hours. Because of bleeding after the placenta was passed, she was taken to the O.R. and a transverse posterior laceration of the cervix was discovered and repaired. At six weeks, the cervix was grossly distorted but the internal os seemed to be intact.

Case No. 4

Mrs. G. V. A. (age 28, gravida 5, para 4, gestation 17 weeks) had severe bleeding before she aborted. At examination, the placenta appeared at the cervix and was removed. The fetus was found to have ruptured through the anterior surface of the cervix and lower segment, and to have lodged in the left broad ligament. An abdominal hysterectomy was carried out.

Case No. 5

Miss B. M. (age 18, gravida 1, gestation 16 weeks). After abortion, an 8 × 2 cm. oval defect was found in the posterior cervix and repaired in layers with chromic gut. At six weeks, a $2^1/_2$ cm. defect remained in the posterior cervix communicating with the uterine cavity but has not yet been repaired.

Case No. 6

Miss B. P. (age 19, gravida 1, gestation 16 weeks) actually aborted through a tear in the posterior surface of the cervix, and the external os did not dilate. This tear was repaired with chromic gut in layers and at six weeks appeared to have healed completely.

Case No. 7

Miss K. H. (age 19, gravida 0, gestation 15 weeks) appeared to have no unusual difficulty. However, at routine post-delivery examination, she was found to have a longitudinal incomplete tear in the posterior of the cervix, which showed as a bruise at the posterior vault and which could be felt from inside. This was allowed to heal spontaneously.

DISCUSSION

Most of our complications were in young primigravidas, but some also occurred in multiparas. The dose of saline was constant but the dose and rate of infusion of Oxytocin varied

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considerably according to the needs of the case, and one patient had no Oxytocin. The duration of stimulation also varied considerably.

The technique for the repair of each laceration appeared appropriate for the case, and all were sutured with chromic gut in one or more layers using interrupted 0 sutures. Some repairs were successful; others were not. The successful repairs were mostly vertical lacerations and somewhat comparable to cervical lacerations seen after term delivery.

Our small experience with laminaria tents in mid-trimester abortion has so far been relatively unsatisfactory because of frequent mild or moderate sepsis, and we have not persisted with this technique in mid-trimester cases.

We are aware of only one pregnancy following a tear, and this ended in spontaneous abortion. We still do not have long-term follow-up on these cases. Skajaa[1] reports seven cases of laceration similar to ours, only one of which was subsequently free of continuing complications, including repeated abortion, abnormal bleeding, discharge, and fistula.

CONCLUSION

One percent of our saline mid-trimester pregnancy terminations had the severe complication of laceration of the cervix or lower uterine segment. These traumatic complications are difficult to repair, generally do not heal well and persistent disabling problems are likely to follow.[2] The procedure of mid-trimester termination is in itself highly traumatic emotionally, and very painful physically. By contrast, the first-trimester suction termination is both simpler and safer. We urge our colleagues to allow no delay where the termination of pregnancy is indicated. □

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Brief Note

Penicillinase-Producing Gonococci

THE NEED TO TAKE CULTURES ON ALL PATIENTS SUSPECTED OF HAVING GONORRHOEA

The first Canadian isolate of a penicillinase-producing gonococcus was reported from Halifax. This emphasizes the potential for importation of such strains to the Maritime provinces which are visited by people from many countries.

These gonococci which are absolutely resistant to penicillin are thought to originate from the Far East but once established in an area may have a great potential for spread. Some centers report that penicillinase-producing gonococci are also relatively resistant to tetracycline so that the treatment of choice for patients and contacts infected with this gonococcus is spectinomycin 2 Gm IM.

Aqueous procaine penicillin in a dosage of 4.8 million units (5 cc in each buttock) along with probenecid 1.0 Gm by mouth remains the treatment of choice for uncomplicated gonorrhoea. Alternative acceptable regimens for uncomplicated gonorrhoea are a stat dose of 3.5 Gm of oral ampicillin along with 1.0 Gm probenecid or tetracycline 1.5 Gm stat followed by 0.5 Gm qid for 4 days. The latter regimen is less acceptable because its effectiveness is more dependent on patient compliance. It is advisable to reserve spectinomycin for patients with penicillin resistant gonococci and not use it routinely so that spectinomycin resistant gonococci do not have an opportunity to develop. Injectable benzathine penicillin (Bicillin) or any oral penicillins should *never* be used for the treatment of gonorrhoea because they do not produce adequate serum levels of penicillin.

The emergence of penicillinase-producing gonococci highlights the importance of taking cultures on *all* patients suspected of having gonorrhoea so that patients infected with penicillinase-producing gonococci can be identified and treated adequately and so that special efforts are made to locate and treat their contacts. It is particularly important that patients who do not respond to the recommended treatment with penicillin or ampicillin have specimens taken for culture. The physician should indicate on the lab form that he suspects that the patient is infected with a penicillin resistant organism.

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□

Migraine

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There are records of migraine as far back as the writings of Aretaeus of Cappadocia at the end of the first century A.D. Galen introduced the term hemicrania, from which the term migraine comes, in about 160 A.D. Migraine is a common problem affecting about one in ten people in our population. It is also one of the most common problems in family practice and the single commonest reason for a referral to a neurologist.

Migraine is a vascular headache. It is a periodic, throbbing headache, unilateral at the onset, associated with irritability, nausea and sometimes, vomiting and photophobia.

EPIDEMIOLOGY

The prevalence of migraine in the population varies between 5 and 20% in different studies, but 10% is a reasonable figure. About 70% of migraine patients are women but then women with headaches tend to seek medical help more than men. However, all series report a greater proportion of women including door-to-door community studies.

About one-half of the patients with migraine have their onset before age 16 and a third of them before age 10. Most adults with migraine have the onset in the teens, and the headaches often disappear in the forties.

Sixty percent of patients with migraine have a family history of migraine or chronic headaches. It appears that some instability of central vascular control might be the inherited factor but this is uncertain.

TYPES OF MIGRAINE

Classical Migraine

This type of migraine implies an aura followed by a headache. The aura is usually visual but can be motor or sensory. The initial visual aura is commonly blurring of vision, bright spots of light or zig zag silver lines. These are often to one side of the visual field and may move. Occasionally the aura consists of numbness around the mouth or in the hand, numbness down one side of the body, difficulty in speaking or actually hemiparesis or paralysis. It is not uncommon for the aura to occur without a headache and this will pose a difficult diagnostic problem unless there is a good history of the migraine headaches.

About two to ten minutes following the onset of an aura the headache begins as an unilateral throbbing headache, usually in the fronto-temporal region. The headache builds to a peak and is associated with irritability, nausea, sometimes vomiting, photophobia and hyperacusis. Other symptoms may be abdominal distention, coldness of the extremities, vertigo, tremors, pallor, dryness of the mouth, excessive sweating and chills. During the attack, patients often lie down in a quiet dark room, and after an attack they often feel very well but may have urinary frequency.

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TABLE I

TYPES OF MIGRAINE

Classical migraine	
Common migraine	
Cluster migraine	
Vertebrobasilar migraine	
Migraine variants:	Hemiplegic and ophthalmoplegic migraine
	Childhood migraine
	Orgasmic headaches
	Carotodynia
	Combined headaches

Common Migraine

This is similar to classical migraine except that there is no aura and the headache is more often bilateral.

Cluster Migraine

This type of headache occurs in young males and is one of the most severe clinical headaches. It begins as a sudden, severe, unilateral boring pain in the retro-orbital region, and is so severe that many of these patients contemplate suicide, may bang their head against the wall and characteristically pace around the room. The headache can easily be diagnosed by noting the associated symptoms of excessive lacrimation, stuffiness or runny nose and, in many cases, a Horner's syndrome all on the same side as the headache. The headache is shorter in duration than most clinical headaches, lasting about 20 to 40 minutes. It occurs daily in bouts lasting three to six weeks and may have an unique timing, with the headache occurring at exactly the same time each day.

Vertebrobasilar Migraine

This form of migraine occurs in young women. Unlike classical migraine which occurs in the carotid territory, the brain stem symptoms in this variety result from vascular ischemia in the vertebrobasilar territory. The young woman experiences bilateral visual field defects or flashing lights, vertigo, ataxia, dysarthria, and tinnitus. She may experience paresthesiae in her arms and legs, and around the lips and tongue. There may be vomiting and increasing drowsiness but they rarely become unconscious. These symptoms are then followed by a throbbing occipital headache. As the young woman gets older this type of migraine decreases and more typical, classical or common migraine replaces it.

Hemiplegic and Opthalmoplegic Migraine

A dramatic aura of migraine can be a marked weakness on one side or marked sensory loss. In some instances this variant runs in families. Another unusual aura is ophthalmoplegic migraine in which there is paralysis of eye muscles and this may persist long after the headache has cleared, sometimes remaining for days.

Childhood Migraine

It is not generally recognized that migraine is relatively common in children. It is now known that "cyclic vomiting of childhood", "the periodic syndrome" and "childhood acidosis" are terms used to describe a clinical picture that is now recognized as migraine. In children the headache is a relatively minor part of the syndrome, whereas abdominal cramps, nausea and vomiting are more dramatic. The child thus complains about feeling "sick to his stomach" rather than of headache. In children, migraine is a shorter event but may occur more than once in the same day. Many of these children are suspected of having appendicitis, particularly since a slight fever and leukocytosis may occur in the attack. When they become adults, a third of them no longer have headaches, and only 20% had frequent migraine. Thus the prognosis of childhood migraine is quite good.

Orgasmic Headaches

Also not widely recognized as a clinical syndrome, we have seen three patients with severe pounding migraine-like headaches associated with sexual intercourse, with the onset of the headache at the time of orgasm. Eventually these men avoided intercourse because of fear of the severe, sudden headache. This is probably a migraine variant, and treating these patients with migraine medications has been effective in all three.

Carotodynia

This unusual syndrome is characterized by tenderness over the carotid artery in the neck and an aching pain over the neck and the lower portion of the jaw. Based on a feeling that this is migraine with the vascular involvement primarily in the carotid artery, we have successfully treated four patients using migraine medications.

Combined Headaches

Muscle contraction headaches (often called severe tension headaches) commonly occur in association with migraine. Muscle contraction pains around the neck, radiating to the top of the head or to the bifrontal and retro-occular region are then associated with the throbbing unilateral headache of migraine. The symptoms of muscle contraction headaches and vascular headaches so commonly occur in the same individuals that there is blurring of the usual separate classification of these headaches. In our experience, most chronic headache patients will have both muscle contraction and vascular symptoms either together or separately, regardless of whether their basic problem appears to be migraine or tension headaches.

TABLE II

DIETARY RESTRICTIONS IN MIGRAINE

Cheese	Smoked meats
Chocolate	Spiced meats
Alcoholic drinks, particularly red wine	Pickled herring
Nuts	Eggs
Mushrooms	Fried fish
Chicken liver	Coca Cola
Meat extracts — boullion cubes, oxo, marmite	Ginger Ale
Citrus fruits, pineapple, figs, bananas and plums	Monosodium Glutamate
	Chinese food

Non-Migrainous Vascular Headaches

There are many vascular headaches which are not regarded as migraine. The hangover headache is the best example. Other causes are fever, caffeine withdrawal, cerebrovascular insufficiency, postconcussion headache, postconvulsion headache, hyperglycemia, hypertension and nitroglycerin. The short lived but severe "ice-cream headache" is probably vascular in origin.

THE BASIS OF MIGRAINE

It is important to understand that there is a *primary basis* for migraine, and *secondary precipitants* or triggers. The primary basis of migraine appears to be a constitutional or familial basis in most individuals. Given this primary predisposition, there are then many precipitants which may trigger the headaches. The precipitants vary from individual to individual but the following are commonly important factors.

Emotional stress is the most common precipitant and the headaches may occur during the period of stress, or in the "let down" following such periods of tension. Thus migraine sufferers often complain that their headaches occur on weekends, after examinations, or on vacation.

Endocrine factors are important as headaches in childhood often terminate at puberty; adult migraine often begins at puberty; the headaches commonly disappear during pregnancy but are aggravated by the birth control pill; and migraine often disappears at the menopause. It is difficult as yet to make much sense out of the endocrine pattern.

Particular note should be made of the relationship of migraine to the birth control pill, as it is common for women on The pill to have their migraine markedly aggravated and medications that previously controlled to the headaches may no longer be effective. In this instance they ought to be taken off the pill. The complications of the birth control pill are higher in these individuals and we can now regard classical migraine as a contraindication for the birth control pill. It is also noted sometimes that women will begin to have migraine for the first time when put on the birth control pill. Unfortunately, the migraine that is initiated or aggravated by the birth control pill does not always disappear when the pill is stopped.

Although it is not common for patients to volunteer that certain *foods* will give them migraine (Table II), they will often respond to eliminating from their diet foods that contain tyramine. The common foods that aggravate or precipitate migraine include cheese, alcohol (particularly red wine), chocolate, nuts, citrus fruits, pineapple, figs, bananas, plums, spiced or smoked meats, meat extracts (boullion cubes, Oxo), chicken liver, pickled herring, vinegar, eggs, fried fish, coca cola, ginger ale, monosodium glutamate, Chinese food, and hot mustard. We have extremely good results by removing these foods from the diet of patients with poorly controlled migraine headaches. In some instances control of migraine was achieved only by altering the diet. Although I have no explanation for this, we have also seen instances in which the patients craved the very foods that precipitate their migraine, i.e. cheese or chocolate. Why the patient would crave foods that aggravate or precipitate migraine during a migraine headache is very puzzling.

Bright lights often precipitate or aggravate migraine and patients with migraine recognize that bright sunshine, the glare off snow, and fluorescent lights are very annoying. Although it was often said that people who wear sun glasses indoors are neurotic, many of these individuals just have migraine.

Migraine is commonly associated with *menstruation,* particularly in young women, where there is often a clear relationship to menstruation and occasionally to ovulation. As the years go by this relationship tends to decrease.

Prolonged fasting may precipitate migraine. Although true hypoglycemia will precipitate migraine, many of these patients will experience migraine just from not eating for a prolonged time, although their blood sugars are normal.

THE MIGRAINE PERSONALITY

There is some argument as to whether there is a true migraine personality. I think that there is no basis to feel that a certain personality type is more likely to have migraine, but probably individuals will have more frequent and severe migraine if they have certain personality traits. The migraine patient is said to be delicate in childhood, shy but stubborn in outlook, competitive and rigidly perfectionistic. They are hard driving, efficient workers who tend to be obsessional about their work and home. They approach problems intellectually rather than emotionally, work too hard and relax too little. They are concerned about the approval of others, compulsively overloading their time and tend to have unresolved hostility and conflict. They often experience a headache after facing up to self-imposed challenge, and often in the "let down" period afterwards.

Despite the designation of a migraine personality, many patients with migraine do not have these traits, and many individuals with these traits do not experience migraine. This probably indicates that approaches to stress pose an important precipitating factor in migraine, but these constitute just one further precipitating factor in a long list of factors. Selby and Lance found that 42% of migraine patients had normal personality structure, 23% were obsessional, 22% hyperactive and chronically tense, and 13% anxious.

THE BIOCHEMISTRY OF MIGRAINE

The biochemical changes in migraine have been complex and puzzling. There does appear to be a marked rise in serotonin levels prior to the headache and this may account for the vasoconstrictive aura phase. These levels then drop precipitously and this may account for the vasodilation headache that follows. A full discussion of the biochemistry of migraine is found in the excellent monograph by Lance.

TREATMENT OF MIGRAINE

Treatment of the Acute Episode

The initial step in the management of a patient with chronic recurring migraine is to take sufficient time to explain clearly the headache to the patient (Table III). They should understand what the headache is, why it occurs, and what the precipitating factors are. The patient often requires reassurance, as they commonly worry about serious underlying brain disease as a cause.

It is worthwhile providing the patient with a list of the precipitating causes for migraine headaches and a list of the foods that commonly act as precipitants.

I give each patient a pamphlet from The Migraine Foundation, 390 Brunswick Avenue, Toronto, Ontario, M5R 2Z4. This Foundation was established in 1974 and now provides some excellent literature and books for the patient with migraine. "The Headache Book" by Arnold Friedman, (Dodd, Mead and Company 1973, $6.75) is an excellent review of headaches by a world expert on the subject and gives a good overview of the headache problem in the sufferer.

TABLE III

TREATMENT OF MIGRAINE

General Measures
Explanation and reassurance
Reduce stress and tension
Avoid alcohol excess
Avoid dietary precipitants (see table)
Avoid missing meals
Discontinue oral contraceptives
Avoid oversleeping
Regular exercise, particularly walking
Management of the Headache
Take two ASA or similar mild analgesics at onset of symptoms
Rest in quiet dark room
If ASA has not been helpful in past, use stronger analgesics (282 Mep, Fiorinal with Codeine) at start of headache
If necessary later use Ergot preparations at start of headache (Cafergot-PB tabs or suppositories)

When the patients gets an attack, I ask them to take simple analgesics first but the primary rule is to take them early in the headache. I suggest the use of Aspirin or similar mild analgesics at the very onset of the headache or when there is any warning that a headache is about to occur. Because analgesics and other medications are absorbed poorly during a migraine headache, they are of little value when the pain is at its peak and often just increase the nausea. If possible a brief period of rest in a quiet room is helpful. Only after mild analgesics, dietary restriction and an increased awarenesss in the patient about their headaches has failed to change the pattern, do I move to other medications. I would then suggest the use of 282 Mep tablets at the onset of a headache, and occasionally ergot suppositories. If nausea is a marked problem, Gravol is helpful. Occasionally, patients may be seen in a continuing severe migraine that will not stop. If it continues for days, then a period of bed rest and parenteral dexamethasone for 48 hours is usually helpful. There are many other medications for migraine but these are usually all that is required.

Long-term Management

The prophylactic treatment of migraine should only be considered when the patients' headaches are severe and frequent enough to interfere with their lives (Table IV). Methysergide (Sansert) is the standard medication but is now superseded by other drugs that are as effective and less toxic. The major complications of this drug were retroperitoneal fibrosis, renal failure, pulmonary fibrosis and cardiac valve damage.

Propranolol in doses ranging from 40 to 120 mgs/day are commonly helpful in the prophylactic management of migraine and cause few side effects, if patients with asthma, borderline cardiac failure and diabetes are excluded.

TABLE IV

PROPHYLACTIC TREATMENT OF MIGRAINE

The following drugs are effective in the prophylactic management of migraine. One drug should be tried for 3 to 6 months before concluding that it is ineffective before starting another drug.

Propranolol (Inderal) 10 mg t.i.d., increase slowly as required to a maximum of 40 mg t.i.d.

Pizotyline (Sandomigran) 0.5 mg at bedtime, increasing by 0.5 mg each day to a maintenance of 0.5 mg t.i.d. on day 3. Maximum dosage 2 mg t.i.d.

Amitryptiline (Elavil) 10 mg t.i.d. Increase as necessary to 25 mg t.i.d.

Carbamazepine (Tegretol) 100 mg b.i.d. Increase as necessary to maximum of 200 mg q.i.d.

Dimethothiazine Mesylate (Promaquid) 20 mg t.i.d. Maximum 40 mg t.i.d.

Methysergide (Sansert) 2 mg at bedtime. Increase slowly over one week to 2 mg t.i.d. Continue only for 6 months then *must* be stopped over one week and the drug discontinued completely for one month before restarting.

Sandomigrain is a new treatment which promises to be useful, although we have found excessive weight gain to be a major problem in its use. Amitriptyline (Elavil) is useful in the prophylactic management of migraine in doses of 10 to 25 mgs. t.i.d. Carbamazepine (Tegretol) can be very useful in intractible migraine. Dimethothiazine mesylate (Promaquid) is also used in the prophylactic management of migraine but appears not to have any benefits over the other drugs.

If prophylactic thereapy is started, then it should be considered on a six months basis initially. If the patient's headaches are controlled then it is worthwhile seeing if the patient can they get along without the drug. If the headaches return they may be controlled by simplier measures, but if necessary the prophylactic drugs can be restarted. If methysergide is used, it *must* be used intermittently with the patient on the drug for five or six months and then the drug completely stopped for one month, before restarting for a further five or six months. Most of the serious complications of methysergide are avoided if intermittent therapy is used, although we have had severe vasocontrictive complications within the initial six months period.

Because cluster migraine occurs in bouts, the therapy should be given for a period of five or six weeks. The severity of the headaches demands the use of prophylactic medications. Because it is used for a short period, we often start with methysergide, but propranolol, carbamazepine and ergot drugs are also effective. Because the headaches often have a characteristic timing, the medication may be taken $^1/_2$ to 1 hour prior to the expected headache. Alcohol must be avoided during a bout because it will induce the headache even after one drink.

If the migraine is associated with muscle contraction headaches of tension, then other measures that are important include neck exercise, local heat, massage, and a general exercise program. Muscle relaxation exercises are particularly useful. These patients often find hot baths to be very relaxing as they are feeling generally tense.

INVESTIGATION

In most instances no investigation is required. A patient with long-standing characteristic migraine with a family history of such headaches usually does not require investigation for underlying conditions. The most useful investigation, when an intracranial lesion is suspected, is a brain scan. This would pick up subdural hematomas, brain tumors and other space occupying lesions, which are the usual worries. The EEG is more often confusing than helpful and I would not recommend its use as a routine investigation in headache. Skull x-rays are also not very informative except in a few unusual instances, but may be useful in reassuring the patient. (There is a general feeling in the population that you haven't been investigated until you've been x-rayed)! The use of CSF examination, CAT scans, and other investigations should only be used when specifically indicated.

CONCLUSION

Migraine is a common and often distressing disorder that affects 20% of the population. Much can be done to control and relieve the headaches in these individuals, particularly if they are given a clear understanding of the mechanism of the headache, and the precipitating factors. The physician is there to help them manage their own headaches, but much of the effective management of migraine has to be carried out by the patient. □

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A Survey of Rectal Bacterial Flora in a Perinatal Population

A Prospective Study of the Prevalence of Listeria Monocytogenes*

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SUMMARY

From 13 May 1974 to 31 March 1975, we studied duplicate rectal swabs collected within one hour after birth, and umbilical cord sera from 463 infants, 14.2% of the total births at the Grace Maternity Hospital. We also included Gray's cold enrichment technique for detecting *Listeria monocytogenes*. Of the infants, 173 were delivered by cesarean section and 290 per vaginam (including 23 stillbirths). A bimonthly environmental survey was performed in rooms where swabs were collected. Colonization occurred within one hour in 52.2% of livebirths per vaginam and in 58.8% of stillborn, but in only 17.3% of those born by cesarean section. Time between rupture of membrane and delivery did not affect colonization unless rupture occurred more than 24 hours before delivery. Group B streptococci were isolated from 11 (2.4%) infants, Group C streptococcus from 1 (0.22%), coagulase-positive staphylococci from 4 (0.86%), *E coli* from 19 (4.1%) *Bacteroides* from 9 (1.9%) and Pseudomonas from 2 (0.43%) infants. *L. monocytogenes* 4b, was isolated from one infant (0.22%), Twin A of a set of twins, from whom Group B streptococcus and *E. coli* were also cultured. Environmental flora played no significant role in the colonization of infants with pathogenic bacteria. *L. monocytogenes* antibodies were not detected in any infant's sera in our study.

INTRODUCTION

There are few studies of the first indigenous flora of the meconium and none involving infants born by cesarean section. Hall and O'Toole[1,2] in 1934 and 1935 found that of 100 samples of the first meconium passed in newborns, 38% and 40% respectively contained bacteria but they could show no relationship between the presence of bacteria and placental membrane rupture.

In 1943 Roufagalis[3] concluded that first contamination of the meconium occurred very early, ascending via the anus. Feldheim *et al.*[4] in 1960 reported that first stools usually contained bacteria but they had collected samples for only 1, 3, 5 and 7 days post partum.

In 1967, Steitzel[5] cultured organisms from 103 (90%) of 114 rectal swabs collected from newborns before the umbilical cord was cut. He found that length of time between membrane rupture and birth had no significant influence on the kinds of organisms isolated. His isolates included, *Listeria, Staphylococcus*, beta haemolytic streptococci, *E. coli*, lactobacilli, diphtheroids, alpha haemolytic streptococci and *Candida*.

To determine whether organisms are present in the amniotic cavity before rupture of the membranes, several investigators[6-10] have examined samples of amniotic fluid before membrane rupture but were unable to demonstrate colonization.

We studied the rectal flora, within one hour of delivery, in a perinatal population at a maternity hospital to determine the prevalence of *Listeria monocytogenes*. Our observations may facilitate the understanding of colonization in neonates.

Materials and Methods

Between 13 May 1974 and the 31 March 1975, we studied the bacterial flora from rectal swabs of 463 infants (representing 14.2% of the total of 3,254 births) born at the Grace Maternity Hospital, Halifax, Nova Scotia. Of these 290 were born per vaginam and 173 by cesarean section. Two hundred and four were healthy full term infants admitted to the regular nursery where the cultures were obtained at random on admission; 142 were from the Special Neonatal Care Unit including prematures and ill newborn infants; 23 were stillborns. Of the 173 infants born by cesarean section, rectal swabs were obtained from 94 in the operating room immediately after delivery.

Duplicate rectal swabs were collected from each infant within one hour after birth using cepti-seal culturette swabs (Mediflex, Medical Supply Co., Rockford, Illinois). One swab was immediately plated out on prepared blood agar plates (BBL, Becton, Dickinson and Co., Clarkson, Ontario) and MacConkey agar (Difco Laboratories, Detroit, Michigan). We used a pre-reduced blood agar plate to isolate anaerobes and a nalidixic agar plate (Tryptose Soy Agar (Difco) to which was added 0.4% nalidixic acid (Winthrop Laboratories, Aurora, Ontario) to isolate *Listeria monocytogenes*.[11,12] The pre-reduced plate was incubated anaerobically (BBL Gas-Pak) at 37°C; the others were incubated aerobically at 37°C.

The second swab was placed in a tube containing 8 ml of Tryptose Soy Broth (Difco) and incubated at 4°C. This "cold enrichment" technique of Gray *et al.* (1948) was used to enhance the isolation of *Listeria monocytogenes*. Samples were plated out at one and three month intervals on blood agar and nalidixic agar plates.[13,14] Isolates were identified

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according to standard methods.[15] Lancefield grouping of beta haemolytic streptococci was performed at the Department of Clinical Bacteriology, Pathology Institute, Halifax; the isolate of *Listeria monocytogenes* was forwarded to the Laboratory Centre for Disease Control, Ottawa, for confirmation of identification and serotyping.

Cord blood samples taken from 427 (92.2%) infants were tested for the presence of antibodies to *Listeria monocytogenes* using the method described by Larsen and Jones.[16]

At two month intervals during the study, an environmental survey was conducted in the delivery room and the two nurseries where rectal swabs were collected; swabs were taken from the most commonly contaminated areas (scales, incubators, humidifiers, sinks, warming boxes, trays, oxygen tubes, I.V. pump etc.) and from the hands of staff.

Results

Table I compares the colonization in infants delivered per vaginam with those by cesarean section. More than half the infants born vaginally (52.2 and 58.8%) were colonized within one hour in contrast to less than one-fifth (17.3%) of the infants born by cesarean section (P = 0.001).

Table II shows the number of infants from whom microorganisms were isolated. Three of the 173 infants delivered by cesarean section were colonized with pathogens.

Listeria monocytogenes was isolated from one infant (0.22%), Group B streptococci from 11 (2.4%), Group C streptococcus from 1 (0.22%), coagulase-positive staphylococci from 4 (0.86%), *E. coli* from 19 (4.1%), *Bacteroides sp.* from 9 (1.9%), and *Pseudomonas sp.* from 2 infants (0.43%).

The relationship between fetal membrane rupture and colonization of infants is shown in Table III. After 24 hours, colonization increased from 57 to 71% in infants delivered per vaginam and from 15.2 to 60% in those delivered by cesarean section.

We were unable to detect a *L. monocytogenes* antibody titre in any of 427 sera tested, including that of the infant from whom *L. monocytogenes* was isolated.

Table IV shows the result of the bimonthly environmental survey in the Delivery Room, Admitting Nursery and Special Neonatal Care Unit. Coagulase-positive staphylococcus was isolated from the Delivery Room on one occasion only. *E. coli,* isolated on 3 occasions, was found only in the Special Neonatal Care Nursery. *Pseudomonas sp* was isolated from each of the rooms surveyed. No other pathogenic organisms were isolated from any of the rooms surveyed. Coagulase-negative staphylococcus was the most frequently isolated organism.

Case Report

Infant K was the first twin (A) of 36 4/7 weeks gestational age, born to a 24 year old mother who had had a normal child

TABLE I

COMPARISON BETWEEN VAGINAL AND CESAREAN SECTION DELIVERIES*

Rectal swab culture results	NUMBER OF INFANTS		
	Born by vaginal route		Born by cesarean section
	stillborn	livebirths	
Total	23	267	173
Organisms were isolated	12 (52.2%)	157 (58.8%)	30 (17.3%)
No organisms were isolated	11 (47.8%)	110 (41.2%)	143 (82.7%)

*The observed difference between vaginal deliveries (live and stillborn) and cesarean deliveries is highly significant (P = ≤ 0.001).

TABLE II

NUMBER OF NEWBORNS FROM WHOM MICROORGANISMS WERE ISOLATED

Microorganisms Isolated as pure cultures	Vaginal deliveries		Cesarean section deliveries
	stillborns	livebirths	
Gram-positive Microorganisms			
Listeria monocytogenes	0	1	0
Group B streptococcus	2	9	0
Group C streptococcus	0	1	0
Coagulase-positive staphylococcus	0	3	1
Candida	0	2	0
Lactobacillus	0	26	2
Coagulase-negative staphylococcus	2	37	15
Alpha-haemolytic streptococcus	0	6	0
Enterococcus	0	2	1
Gram-negative Microorganisms			
E. coli	1	16	2
Bacteroides	1	8	0
Pseudomonas	0	2	0
Isolated as mixed cultures (diphtheroids, Anaerobic streptococcus, Anaerobic micrococcus, Clostridium, Lactobacillus, Coagulase-negative staphylococcus, etc.)	6	46	9

by a previous pregnancy. During this pregnancy she received prenatal care from the second month. Labour was spontaneous. She delivered this boy by easy vertex under epidural anesthesia, and 10 minutes later a girl by easy spontaneous vertex.

The boy had stage 1 asphyxia with an apgar score of 8; respiration began within one minute after birth. The infant was undergrown (1650 gm for 36 weeks gestation -2 S.D.), had increased tone and was "jittery". Blood glucose was normal. From 6 hours of age to day eight he was given penicillin 30,000 units/kg body weight/day divided into two doses. He remained "quite irritable" and his dextrostix continued to be normal. The serum calcium was 12.8 mg/100 ml, and repeated next day was 8.9 mg/100 ml. His irritability lasted throughout his stay in the nursery. Somewhat low set ears, hypereliorism, and separated sutures were noted. At 12 days of age a T4 of 7.9 mcg/100 ml was found. Roentgenogram showed bone age of 36-38 weeks gestation, compatible with actual age. His progress was good at discharge at 29 days of age.

Organisms isolated from one rectal swab collected within one hour after birth, were identified as Group B streptococcus and *E. coli.* After 3 months of "cold enrichment" the duplicate rectal swab yielded an organism identified as *Listeria monocytogenes,* Serotype 4b, which was sensitive to penicillin, tetracycline, streptomycin, erythromycin, chloramphenicol, kanamycin, and cephalosporin; it was resistant to polymyxin. Umbilical and blood cultures were negative. There was no detectable antibody titre to *L. monocytogenes* in the cord blood serum.

Discussion

Our study indicates certain facts. Over 50% of infants delivered per vaginam are colonized within one hour. The occurrence of colonization appeared the same in both stillbirths and livebirths (52.2% of the stillborn and 58.8% of livebirths — see Table I). This finding contrasts with those of Hall and O'Toole[1] who reported that 38 and 40% of newborn infants respectively had bacterial flora in the first meconium, and Stietzel,[5] who isolated organisms from 90.4% of the 114 newborns from whom he collected rectal swabs at birth before the umbilical cord was cut. These studies included only infants born per vaginam; however, Stietzel stated that further investigations including surgically delivered infants were required. Our study of such infants one hour after birth showed that they had significantly less colonization (17.3 versus 58.8%). We must note, however, that organisms may have been introduced into the rectum from the anal fold. In some instances the swab may have been contaminated with flora from the hands of those collecting the material.

Pathogens were isolated more frequently from infants delivered per vaginam. Only 3 of the 173 infants delivered by cesarean section were colonized with pathogens. The infant, delivered by cesarean section, from whom coagulase positive staphylococcus was isolated was born with severe asphyxia, and was handled a great deal before the rectal swab was collected. One infant delivered by cesarean section from whom *E. coli* was isolated was born fetally malnourished with transient neonatal diabetes. On the day the cesarean was performed the mother was septic, with increased temperature, pulse rate of 140, a foul discharge

TABLE III

RELATIONSHIP BETWEEN RUPTURE OF FETAL MEMBRANES AND COLONIZATION OF INFANTS.

	Born by vaginal route					
Hours Between rupture and delivery	Stillborn cultures positive		Livebirths cultures positive		Cesarean section cultures positive	
	No.	%	No.	%	No.	%
less than 24 hours	10	47.6%	142	57%	27	15.2%
more than 24 hours	2	100%	15	71%	3	60%

TABLE IV

ENVIRONMENTAL SURVEY OF CASE ROOM, ADMITTING NURSERY AND SPECIAL CARE NURSERY

	Times isolated		
Organisms isolated	case room	admitting nursery	special care nursery
Gram-positive organisms			
Coagulase-negative staphylococcus	22	14	17
Coagulase-positive staphylococcus	1	0	0
Bacillus sp.	5	1	2
Enterococci	1	0	2
Alpha-haemolytic streptococcus	0	0	2
Diphtheroids	4	1	4
Sarcina	2	0	0
Candida	0	1	0
Gram-negative organisms			
E. coli	0	0	3
Pseudomonas	1	1	2
Gram-negative bacilli (unidentified)	2	2	4

and tender uterus. Because of the danger of intra-uterine infection, the infant was given colistin and cloxacillin. *E. coli* was cultured from the rectal swab but umbilical, throat, urine and blood cultures were negative. The second infant, delivered by cesarean section, from whom *E. coli* was isolated, was normal with no signs of infection. In all 3 cases, the membranes were intact 24 hours before cesarean section.

It should be noted that Group B streptococci were not isolated from any infant delivered by cesarean section although a number of the mothers had been proven to be carrying the organism in the vagina.

We found that the percentage of infants colonized was not increased when the membranes were ruptured for less than 24 hours. Hall and O'Toole[1] and Stietzel[5] were also unable to show that early rupture of the membranes increased early colonization of the newborn. We found that positive cultures of infants born by cesarean section after more than 24 hours of fetal membrane rupture showed non-pathogenic organisms.

Group B streptococci were isolated from the rectal swabs collected within one hour after birth from 2.4% of the infants (3.8% of those delivered per vaginam) in our study. This compares with 1.2% reported by Franciosi, Knostman and Zimmerman[17] who studied throat cultures collected immediately after delivery in 942 infants. Baker and Barrett[18] cultured throat, umbilicus, and external auditory canal swabs of 206 infants at a mean age of 18.3 hours and recovered Group B streptococci from 26.2% of them. Howard and McCracken[19] reported 25 infants with streptococcal infections (2.5 cases/1000 deliveries).

In our study, only 0.86% of infants were colonized with coagulase-positive staphylococci within one hour of birth; however, at departure from hospital 20-30% were so colonized (unpublished data).

We found that environmental flora did not appear to play any significant role in the colonization with pathogenic microorganisms in newborn infants.

Overt human listeriosis is rare. Between 1951 and Jan. 1, 1972, in Canada, 101 cases of listeriosis were recorded.[20] The true frequency of this disease is probably much higher than generally appreciated and may pass undetected or misdiagnosed.[21]

This is the first reported isolation of this organism in Nova Scotia since 1967. Of 10 previous isolates, 4 were typed and all were serotype 4b. The report for human listeriosis in the U.S.A.,[22] shows that serotype 4b occurred in 21.6% of the cases reported. Albritton *et al.*[23] in 1975 report that it is the most common type, accounting for 46% of the isolates from infants with early onset of the disease.

Our case was twin A of a set of twins; the other twin, a girl, was not infected. Bowmer[20] also reports a case of listeriosis in one of a set of twins delivered by cesarean section. Similar cases of one of twins being infected are reported by Becroft *et al.*[24] and Harper and Howells.[25]

Our case is also of interest in view of the fact that a Group B streptococcus was also isolated from the rectal swab; without the "cold enrichment" technique of Gray *et al.*,[13] the *L. monocytogenes* would have been undetected. In view of the similarities in the epidemiologic, pathogenic, and clinical features of perinatal infections caused by these organisms[26] and our findings, we suggest that this technique might be used to search for *L. monocytogenes* in infants being investigated for Group B streptococcus.[19]

Our lack of positive findings in the testing of cord blood for the presence of *L. monocytogenes* antibodies agrees with the work of Albritton *et al.*[23] who were unable to demonstrate any *L. monocytogenes* agglutinins in either acute or convalescent sera from neonates with listeriosis or in a control group, and with that of Larsen and Jones[16] who were unable to detect titres to *L. monocytogenes* in neonates by the agglutination method, immunoelectrophoresis or immunodiffusion with anti-human IgM. □

Key Words

Rectal bacterial flora, perinatal population, colonization, *Listeria monocytogenes*, Group B streptococci.

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Addendum

Three months after this survey was completed, a two week old infant born in the same hospital was admitted to the Izaak Walton Killam Hospital for Children, Halifax, with the diagnosis of bacterial meningitis. The causative organism was later identified as *Listeria monocytogenes*.

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Listeria Monocytogenes

This organism is widely distributed in nature and its normal habitat is found to occur in domestic pets, mammals, birds, ticks and crustaceans. Human involvement appears to be predominant in the age group of under one and over forty years of age. Strains pathogenic to man are identified by their capacity for reduction of triphenyltetrazolium chloride and pathogenicity to the rabbit cornea, causing kerato-conjunctivitis and monocytic leucocytic infiltration.

Two groups of individuals are principally involved, namely the gravid female and foetus and secondly, the adult subject suffering from concurrent debilitating disease. Thus in the case of the gravid female, infection may pass *via* the placenta to the foetus to cause stillbirth or post partum meningitis. Presumably in such instances susceptibility may be explicable on the basis of the vulnerability of the foetus prior to its acquisition of immunological tolerance. There is no evidence to suggest that the organism is responsible for the causation of congenital abnormalities or other teratogenic effects.

To the contrary, the onset of infection in the mature human subject is less easy to explain since the malady has been closely associated with underlying lymphoreticular disease, diabetes, tuberculosis, x-ray therapy and the administration of adrenocorticosteroids. In short, one may link susceptibility to *Listeria monocytogenes* infection with immunosuppressive phenomena in the compromised host. However, not all cases are explicable as such and, for example, the occurrence of chronic asymptomatic infection of the female genital tract resulting in repeated abortions remains an enigmatic entity. Likewise, rarer complications such as oculoglandular disease, septicaemia, pyrexia, dermatitis, polyserositis and endocarditis unassociated with intercurrent forms of debility are hard to explain.

In the interesting article by MacDonald, Embil, Bustamante and Scott (p. 19), they have drawn attention to the presence of *L. monocytogenes* in Nova Scotia, where since 1967, the organism has been isolated several times. To this, the writer would add that a case of *Listeria monocytogenes* meningitis was observed to affect a 55 year old woman admitted to the wards of the Victoria General Hospital in October 1976.

Although the organism is a comparatively rare one in Nova Scotia, clinicians should nevertheless be aware of its existence and the appropriate steps be taken to establish a bacteriological diagnosis and sensitivity tests. Many strains have been shown to be susceptible to therapy with Penicillin G, Tetracycline, Erythromycin and sulphonamides. Prompt recognition and appropriate specific therapy of *Listeria monocytogenes* infection would appear to be the key notes of a successful assault against this microbe.

Much remains to be learned of the mechanism whereby a large host is able to defend itself against the attacks of a minute microorganism. The rôle of the cellular and humoral antibody systems occasionally fail to exert protective function and the reasons for such offer a challenge to future investigators. □

C. E. van Rooyen, M.D.

Tuberculosis — Changing Concepts in Management

The Rational Use of Antibiotics

PART I — CHEMOTHERAPY

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INTRODUCTION

The modern day treatment of tuberculosis, pulmonary or other forms, consists in the administration of a suitable combination of antituberculous drugs for a protracted period — usually 18 to 24 months. The concepts of prolonged bed rest, fresh air, and extended isolation disappeared with the development of effective drug treatment. In addition, surgical intervention is rarely indicated now and relatively short periods of hospitalization are needed. Indeed, treatment can be initiated safely at home in some instances depending on the extent of the disease, home contacts and other factors. This applies particularly to those patients who are being treated for extrapulmonary tuberculosis with little or no pulmonary involvement.

As far as isolation of the sputum positive case is concerned, the danger of infection decreases with each day of antituberculous therapy. Even if the sputum is positive on concentration for acid fast bacilli at the start of treatment, the average patient will present no danger to others within a relatively short period. Certainly, this statement applies to the careful patient who is taught the proper handling of cough and sputum. There is a rapid decrease in expectoration within three to four weeks of starting treatment even in the patient with appreciable cough and sputum and usually the sputum becomes negative quite promptly. Even before this, the infectivity will have dropped considerably. It is important to remember that the undiagnosed, untreated, individual with tuberculosis is the one who presents the real hazard to hospital staff, fellow patients, and to household contacts.

Not only has the mortality rate dropped dramatically during the chemotherapy era in this part of the world, but also there has been a marked decrease in the incidence of tuberculosis. This situation applies to North America and to the western European countries but, unfortunately, not to the so-called developing countries where tuberculosis is still common. Therefore, BCG vaccination should be considered in the case of tuberculin negative individuals who are travelling to such areas.

ANTITUBERCULOUS DRUGS

The initial treatment of a newly diagnosed case of tuberculosis consists in the administration of a combination of two or three drugs chosen from the following group of five; i.e., streptomycin, para-aminosalicylic acid, isoniazid, ethambutol, rifampin. Insoniazid is always selected as a member of the combination. Isoniazid/ethambutol, isoniazid/ethambutol/strepomycin, isoniazid/rifampin, isoniazid/rifampin/streptomycin, exemplify the various combinations that can be used depending on the extent and severity of the infection. The derivatives of aminosalicylic acid are usually reserved for children under the age of 16 years and for those adult patients in whom there is a visual abnormality that contraindicates the administration of ethambutol.

Other antituberculous drugs include capreomycin, pyrazinamide, cycloserine, viomycin, kanamycin, and until recently, ethionamide. The members of this group of drugs are usually reserved for those patients in whom bacterial resistance has developed to one or more of the usual drugs or for those in whom adverse reactions necessitate a change in therapy.

Antituberculous drugs must be administered in combination in order to prevent the development of resistant strains of *Mycobacterium tuberculosis*. This will happen rapidly if a single drug is given in the presence of multiplying organisms. However, this statement does not apply to the use of isoniazid in chemoprophylaxis, presumably owing to the fact that organisms are few and are not in a state of rapid multiplication. Fortunately, primary drug resistance is rare in this country; i.e., bacterial resistance to one or more drugs at the start of treatment. However, it may be an important factor in retreatment cases.

In the presence of advanced disease it is considered advisable to administer isoniazid and two other drugs in combination at the start of therapy; e.g., isoniazid/ rifampin/streptomycin, isoniazid/ethambutol/ streptomycin, or isoniazid/streptomycin/PAS. INH and one other drug may be administered to those with minimal or early moderately advanced disease; e.g., isoniazid/ethambutol, isoniazid/streptomycin, isoniazid/PAS, isoniazid/rifampin followed shortly by the substitution of ethambutol or PAS for rifampin.

CHARACTERISTICS OF THE INDIVIDUAL DRUGS

1. Streptomycin sulphate (SM). The discovery of the antibiotic, streptomycin, was announced by Schatz, Bugie and Waksman in January, 1944, the first guinea pig experiments being commenced on April 27, 1944. In December of the same year Feldman and Hinshaw instituted clinical trials at the Mayo Clinic and a preliminary report was published in September, 1945.

Streptomycin rapidly proved itself effective and practical in the treatment of tuberculosis and entered general use within the next few months. It was marketed in Canada in 1946. Streptomycin is administered by the intramuscular route and reaches a peak blood level 1 - 2 hours following injection. It

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enters pleural fluid if present, as well as necrotic tuberculous lesions. It is excreted mainly in the urine.

Side effects chiefly involve the vestibular branch of the 8th nerve, particularly in older individuals. Pain may occur at the injection site. Hypersensitivity reactions with urticaria, marked eosinophilia, and hyperpyrexia are not uncommon. Desensitization can be carried out in such cases and usually proves successful. This is done by administering gradually increasing doses of streptomycin commencing at a very low level and increasing the amount on a daily basis. An antihistamine such as chlortripolon may also prove of benefit in such cases. Contact dermatitis can occur among those who handle streptomycin.

Streptomycin is commenced in a dosage of 1 gram daily in the case of adult patients under 40 years of age and a dosage of 1 gram three times weekly to those individuals 40 years of age and older except in the presence of fulminating illness where daily administration may be necessary, even in the older age groups. It is due to the increased risk of side effects that the smaller dose is recommended in the older age groups. In former years, streptomycin was administered by the intrathecal route in cases of tuberculous meningitis but this practice is no longer recommended.

2. Paraminosalicylic acid (PAS). This drug came into use in 1949 and is administered by the oral route. It is bacteriostatic, exerts an intracellular action, and is bound by organisms. It is absorbed via the G.I. tract and reaches most tissues, excretion taking place mainly via the urine. This drug is administered either in the form of the sodium salt of which 14-16 grams is required daily, or the calcium salt in a total dosage of 10-12 grams daily. This means a total of 28 to 32 tablets of the former as these are obtainable only in the 0.5 gram size (0.69 grams has been phased out), or 10 to 15 tablets of the latter daily. The drug may be taken in a single dose or divided into two or three doses daily. One of the main drawbacks consists in the large number of tablets that must be ingested. This fact, together with the common side effect of gastrointestinal distress, has led to the substitution of ethambutol in most adult patients.

Hypersensitivity reactions and liver damage may occur on occasions while goiter and hypothyroidism have been reported. This complication must be extremely rare as not a single case is found among the records of the many hundreds of patients who have been treated with this drug in our hospital, particularly during the early years when virtually all patients received this medication. In such cases, PAS is stated to block the uptake of iodine by the thyroid gland and the synthesis of thyroxine with resultant diffuse enlargement and hypothyroidism.

3. Isoniazid (INH) — came into clinical use in 1952 and has remained the keystone of antituberculous treatment since then. It is usually administered to adult patients in a single dose of 300 mgm. daily (to children 5-10mgm./kg daily). It is bacteriostatic and possibly bacteriocidal but the exact mode of action is unknown. It is absorbed by the G.I. tract and enters all body tissues. Excretion takes place mainly in the urine.

Side effects include liver damage, peripheral neuritis, and hypersensitivity reactions. With regard to liver damage, there is a transitory asymptomatic rise in the transaminase level (SGOT less than 200) in a certain number of patients receiving this drug with regression to normal as treatment continues. However, severe hepatitis may occur, the clinical and pathological picture being indistinguishable from viral hepatitis. The incidence of this complication increases with age and it is extremely important that patients be watched carefully regarding the possible onset of this condition. This refers to those patients who are receiving isoniazid on a chemoprophylactic basis as well as to those who are being treated for active tuberculous disease. Indeed, deaths from hepatitis have been reported among persons in receipt of INH on a chemoprophylactic basis as well as among those who have active tuberculous disease. The hazard increases with age and one must balance the risk against the possible benefits when considering chemoprophylaxis.

There are slow and rapid inactivators of isoniazid — a genetically determined trait — but the therapeutic benefit of the drug is not affected by this factor. However, the slow inactivator may be more subject to isoniazid hepatitis.

Contrary to common belief, peripheral neuritis is a rare complication and it is unnecessary to administer pyridoxine routinely on a prophylactic basis. However, it is a wise precaution to prescribe 25-50 mg. daily in the case of debilitated individuals or those who suffer from chronic alcoholism, diabetes mellitus or neurological disorders. Epileptic patients in receipt of isoniazid will frequently require an increased dose of anticonvulsant drugs, due to the tendency of this drug to trigger seizures in such persons.

Injectable isoniazid is available for intramuscular or intravenous use, but is only indicated in the critically ill patient. For the treatment of infants, there is a syrup containing isoniazid and this can be administered with the feedings. For older children, the tablets can be crushed and mixed with jam or other foods.

4. Ethambutol (EMB) was placed on the market in Canada in 1969 and it rapidly assumed an important role in the treatment of tuberculosis. Ethambutol is administered by the oral route, is bacteriostatic and is bound by the organisms of susceptible strains of *M. tuberculosis*. It then inhibits metabolism and multiplication of the organism and is ineffective if the organisms are in the resting state. Following ingestion, the drug concentrates chiefly in the erythrocytes For some reason the other body tissues or fluid contain little or none. A large proportion is excreted unchanged in the urine and faeces. A process of detoxification takes place in the liver to produce an inactive metabolite which is partially excreted in the urine.

The most frequent and potentially serious side effects of this drug are visual. Optic neuritis may occur and even lead to blindness if due precautions are not observed in the use of this medication. Prior to insititution of therapy, a thorough visual assessment should take place and re-examination should be done at monthly intervals thereafter. Each check-up should include ophthalmoscopic examination together with testing of the visual fields, color vision and visual acuity. The patient must be alerted to report any subjective disturbance and to discontinue the drug immediately should there be any doubt in this regard. Such complaints might include blurring of vision, flashing lights in front of the eyes or a diminution of vision. It is obvious that this drug should be withheld in those with severe visual disorders as well as in the case of mentally handicapped individuals.

Other complications include various types of hypersensitivity reaction, liver damage, gastrointestinal distress, peripheral neuritis, mental disturbances, and alopecia. Elevation of the uric acid level may lead to exacerbations of gout.

Ethambutol is administered in a single oral dose daily, usually starting at the level of 25 mgm per kilogram and decreasing to 15 mgm/kg after two months. However, some authorities have questioned the value of the 15 mgm/kg dosage.

Ethambutol is not recommended for children under the age of 16 years.

5. Rifampin (RFM). Rifampin came into use in Canada in 1969 commencing with a series of clinical trials, and it was placed on the market in 1972. It was soon recognized that rifampin was the most potent antituberculous agent to come into use since the advent of isoniazid in 1952. It proved to be as effective and possibly more so than INH. However, it does not differ from INH and the other drugs in that resistant strains of *M. tuberculosis* develop very rapidly if it is administered alone. It must be given in combination with at least one other effective drug to produce an adequate therapeutic response.

TABLE I

TREATMENT OF MYOBACTERIAL DISEASE*

DRUGS

DRUG	DOSAGE	SIDE EFFECTS	MONITORING	REMARKS
Streptomycin	15-20 mg/kg up to 1 g IM daily or 25-30 mg/kg twice weekly	8th nerve damage, nephrotoxicity	Vestibular function audiograms, BUN, and creatinine	Use with caution in older patients or those with renal disease.
Para-amino-salicyclic acid	150 mg/kg up to 12 g PO daily	Gastrointestinal hypersensitivity, hepatotoxicity, sodium load	SGOT/SGPT	GI side effects very frequent, making cooperation difficult
Isoniazid	5-10 mg/kg up to 300 mg PO or IM daily	Peripheral neuritis, hepatitis, hypersensitivity	SGOT/SGPT (not routine)	Bacterial; for neuritis, pyridoxine, 10 mg as prophylaxis; 50-100 mg as treatment daily.
Ethambutol	15 mg/kg PO daily	Optic neuritis (reversible with discontinuation of drug; very rare at 15 mg/kg); skin rash	Red-green color discrimination and visual acuity (monthly)	Use with caution in renal disease or when eye testing is not feasible.
Rifampin	10-20 mg/kg PO up to 600 mg daily	Hepatitis, febrile reaction, purpura (rare)	SGOT/SGPT (routine hematological examination)	Bactericidal; orange urine color, benign.
Capreomycin	15-30 mg/kg up to 1 g IM daily	8th nerve damage, nephrotoxicity,	Vestibular function audiograms, BUN, and creatinine	Use with caution in older patients, rarely use with renal disease.
Pyrazinamide	15-30 mg/kg up to 2 g PO daily	Hyperuricemia, hepatotoxicity	Uric acid, SGOT/SGPT	Combination of pyrazinamide and amino-glycoside is bactericidal.
Viomycin	15-30 mg/kg up to 1 g IM daily	8th nerve damage, nephrotoxicity, vestibular toxicity (rare)	Vestibular function, audiograms, BUN, and creatinine	Use with caution in older patients, rarely use with renal disease.
Kanamycin	15-30 mg/kg up to 1 g IM daily	8th nerve damage, nephrotoxicity, vestibular toxicity (rare)	Vestibular function, audiograms, BUN, and creatinine	Use with caution in older patients, rarely use with renal disease.

Check product labeling for detailed information on dose, contraindications, drug interaction, adverse reactions, and monitorind.

*Modified from Basics of RD published by American Thoracic Society, American Lung Association, Peter B. Barlow, M.D., author.

Rifampin is an antibiotic derived from *Streptomyces mediterraneii* and inhibits enzyme activity in susceptible cells. It is bacteriostatic and probably bacteriocidal. It is administered by mouth and 75-90% is bound to serum proteins. It is absorbed by the G.I. tract and distributed to all tissues and fluids. Metabolism takes place in the liver where a deacetylated derivative is formed which enters the bile and is reabsorbed, ultimately undergoing excretion in the urine and faeces. Rifampin is administered in a single daily dose of 600 mgm. which is given one hour before breakfast owing to the fact that higher blood levels are achieved if it is given in the fasting state. Adverse reactions include gastrointestinal distress and may be of such a severe nature that it is impossible for the patient to continue taking the drug. Thrombocytopenia, purpura and liver damage are not uncommon. Other side effects include headache, nausea, vomiting, and confusion.

Rifampin is a red granular powder which imparts an orange-red color to urine, faeces, saliva, sweat and tears. Patients should be warned in this regard. Except in life threatening situations, it is our policy to withhold Rifampin in the case of female patients with childbearing potential, as the possibility of teratogenic effect is still under study. It is worth noting that Rifampin has been reported to interfere with the action of contraceptive pills, and this effect has been attributed to rapid breakdown of estrogens by Rifampin. Not only has the menstrual cycle been altered but pregnancy has occurred in some instances.

Intermittent dosage schedules using the combination of Rifampin 1200 ngs and INH 900 mgs administered twice weekly have been used in some centers. However, there has been a high incidence of toxic reactions which has restricted this particular type of regimen. It had been hoped that supervised administration of this type would have filled a need in the treatment of recalcitrant patients in such areas as the skid row sections of large cities.

Rifampin interferes with the action of the coumadin drugs.

6. Capreomycin is an antibiotic with properties similar to streptomycin but can be used as a substitute for this drug on some occasions.

7. Pyrazinamide is a relatively potent, but at the same time toxic, antituberculous drug which is rarely used today.

8. Cycloserine has weak antituberculous properties.

9. Viomycin and

10. Kanamycin — are also relatively weak drugs.

11. Ethionamide As noted above, this drug has been removed from the market, probably due to relative ineffectiveness.

Table I shows the principle drugs in current use. In the second part of this article a review of 100 consecutive patients treated for Tuberculosis at the Miller Hospital will be presented. □

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Diffuse Mesothelioma of the Pleura

A Report of Three Cases*

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Mesothelioma of the pleura is a rare tumour. In a prospective study begun by the American Cancer Society in 1959, only three of 31,652 deaths occurring in the 34 months covered were due to this neoplasm. At our relatively small institution which, however, has had a quite busy thoracic surgical service, mesothelioma was not encountered at all until 1974 but, since then, there have been two additional patients with the disease. It is the purpose of this presentation to report these three cases in some detail and, in so doing, to possibly support the thesis that exposure to asbestos is a significant factor in the etiology.

Until 1931, there was extreme confusion concerning these tumours. Robertson[1] in 1924 published an extensive historic review on this subject. In his opinion, based on his own experience, there was no such disease as a primary pleural mesothelioma. He felt that only sarcomas could be labelled as primary malignant tumours of the pleura, and that all other growths were secondary and represented extensions, implantations, or metastases from unrecognized or latent primary sources, usually the lungs. This view was not accepted generally and some order was brought out of the chaos by Klemperer and Rabin[2] who, in 1931, introduced the classification which, in most respects, is used today. It was modified somewhat by Clagett[3] and associates and, later, by Porter[4] and Cheek.

Briefly, therefore, it may be accepted that there are two types of primary pleural neoplasms: A local type usually benign but with malignant potential; and the diffuse type which is very malignant and rapidly fatal. The latter is characterized by epithelial cells in tubular or glandular forms, or combined cell arrangements mixed with sarcomatous elements.

Arthritic symptoms with clubbing of the fingers have been reported frequently in association with the localized tumours and disappear following their resection. Although this syndrome may occur with the diffuse mesothelioma, it is most uncommon.

While pleural mesotheliomas may occur at any age, like all cancers they are found usually in the 50 to 70-year group. They are far more frequent in the male sex, and the most common presenting symptom is dyspnea due to the associated pleural effusion. Many individuals will have chest pain and a few, hemoptysis. There appears to be no relation to cigarette smoking, but the association with asbestos exposure is most interesting and will be discussed later.

The only consistent diagnostic finding is the abnormal chest roentgenogram, and this usually reveals the presence of a pleural reaction with or without effusion. The positive physical findings are limited to the evidence of the effusion. Enlarged nodes are most uncommon. Sputum cytology is rarely informative, and even cytological examination of the pleural fluid more often than not fails to reveal malignant cells. Bronchoscopy is usually normal. Needle biopsy is felt to be of little value, the only certain method of diagnosis being thoracotomy.

Treatment in all its modalities is most discouraging. Pleurectomy has been carried out in many cases, and was done in one of the three to be reported. It does not prolong life and probably adds to the terminal morbidity. Radiation therapy alone, chemotherapy alone, or a combination of radiation and chemotherapy have all been tried with equivocal results. In the largest reported series[5], the average mean survival time after diagnosis was 5.80 months with a range of two weeks to 16.80 months.

CASE REPORTS

Case No. 1

O.D.S. A 67-year old white male was referred to the Nova Scotia Sanatorium on March 1, 1974, because of the finding of a dense mass involving the peripheral portion of the left hemithorax in its lower two-thirds. He had been well until a month previously, when he awakened one night with a severe nonproductive cough. He consulted his family physician the next day and was given some pills. On closer questioning, he admitted that he had had pain in his chest as long ago as 1964 and, actually, had been examined on several occasions at his local hospital. The roentgenograms, although not available for study, were reported as normal. A film at his local hospital on February 20, 1974, revealed abnormal shadowing on the left side.

On admission, he was in no distress, and his only symptoms were the chest pain which was not severe, and a cough with a small amount of sputum. The family history was noncontributory. The patient had been a telephone lineman for 35 years but for the past four years had been retired, doing a small amount of mixed farming. He had never smoked cigarettes but had smoked a pipe for 50 years. The only significant past illness was hyperthyroidism, for which he underwent a thyroidectomy in 1950, with complete relief of his symptoms. Except for the chest, the physical examination was normal. There was markedly decreased movement on the left side of the chest and marked dullness was noted over the lower third posteriorly. The breath sounds were present but diminished in the same area.

The admission roentgenogram showed no change from that taken at the patient's local hospital nine days previously. The chest was needled on the day of admission but no fluid was encountered. The patient was a tuberculin reactor, the Mantoux 5 TU being 3+, but all other laboratory findings were normal. In particular, repeated examinations of sputum and bronchial washings failed to reveal malignant cells. Bronchoscopy was carried out March 8, 1974, with completely normal findings.

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A left thoracotomy was done March 26, 1974, and very thick parietal peel was encountered. This was stripped away from the chest wall over an area sufficient to allow insertion of the rib spreaders. Parietal decortication was then continued and the pleural cavity opened. It contained a considerable amount of thin bloody fluid. Surprisingly, the lung underneath looked and felt completely normal. A very thick whitish peel with numerous nodules covered the chest wall, the diaphragm, and the pericardium. The peel was stripped off the chest wall without difficulty but it could not be separated from the diaphragm nor from the pericardium. Incorporated in the midposterior portion of the peel was a large rounded mass. The postoperative course was uneventful, and the lung re-expanded promptly.

The specimen was examined at the Division of Pathology, Department of Public Health, Halifax, Nova Scotia. Sections of tissue showed a thickened hyaline plaque which was practically acellular. However, within this, there was a tumour present, highly anaplastic, consisting of irregular sheets of cells but with no apparent epithelial differentiation. There was no definite stroma component. The pathologist felt that if a primary tumour could be excluded elsewhere, the appearances where characteristic of a mesothelioma. (Fig. 1)

At our suggestion, the pathologist submitted a further report a week later. He had sectioned more of the large plaque and tumour nodule. The plaque was as described before and was largely hyalin with a few cellular foci. Tumour areas were undifferentiated. There were some sheets of cells, vaguely epithelial in character, but no tubules nor glands. He was now convinced that this was a mesothelioma.

The patient was discharged April 11, 1974, feeling fairly well, except for the usual post-thoracotomy pain. Unfortunately, this state of affairs was of a very brief duration, and he soon began to have increased pain in the left chest. When readmitted on May 8, 1974, the pain was becoming excruciating. The roentgenogram of the chest was essentially unchanged.

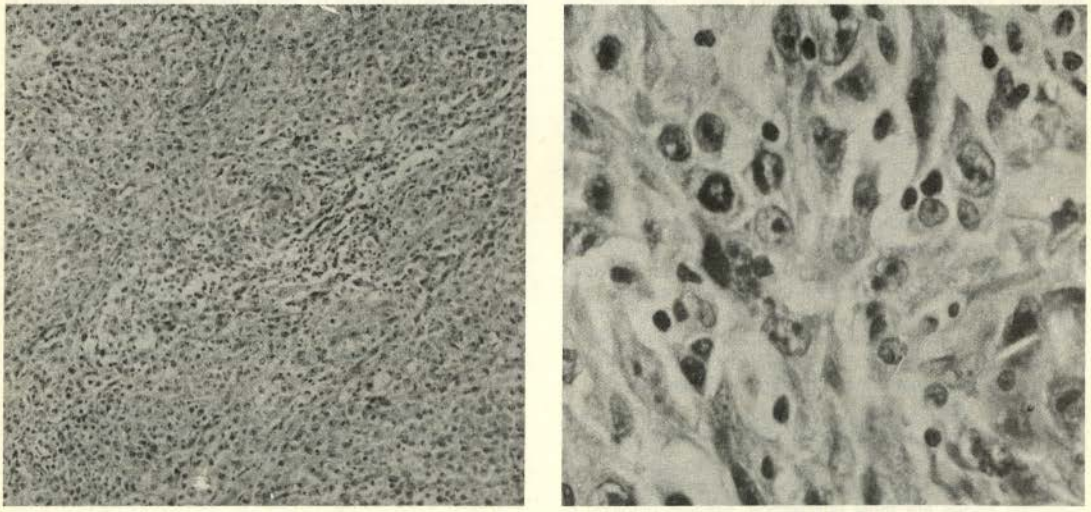
The pain in the chest continued and became more agonizing. Repeated intercostal blockade had little effect and large doses of opiates became necessary. About two weeks following admission there was swelling and thickening of the left loin, suggesting that retroperitoneal progression of the tumour was occurring, even though no tumour tissue was obtained on needling. His course was progressively downhill, and he died June 26, 1974. Unfortunately, permission for autopsy could not be obtained.

Case No. 2

S.G.G. A white male, aged 61, was admitted to the Miller Hospital January 29, 1976. He had developed some discomfort in the left side of his chest some three weeks previously and soon noted that he was becoming short of breath. He reported to his family physician and a roentgenogram at the local hospital on January 14, 1976, revealed a large pleural effusion on the left side. Thoracentesis was carried out at the local hospital and approximately 1000 ml. of serosanguinous fluid removed. This was reported as containing cells suggestively malignant. A further thoracentesis was done for relief of dyspnea and, on admission to the Miller Hospital, his only complaints were soreness in the left chest with occasional cough.

The family history was noncontributory. The patient had been a cigarette smoker for 40 years, using 20-30 cigarettes a day. He had served in the Army during the Second World War and, following this, he was employed in the construction industry. On further questioning after the diagnosis had been made, he revealed that he had had rather intimate contact with asbestos some 20 or 25 years previously. He stated that the asbestos was frequently mixed with water in a pail and sprayed on walls with a fire hose. He had quit the construction industry 15 years previously. There were no significant past illnesses.

With the exception of the chest, the physical examination was normal. There was very poor expansion of the left side of



(A) × 250 (B) × 1250

FIGURE 1

Sheets of malignant cells vaguely suggestive of an epithelioid arrangement supported by scanty fibrillary stromal components and infiltrated by scattered mesothelial cells.

the chest, with flatness over the lower half, particularly posteriorly, and absent breath sounds in the same area. The roentgenograms from the local hospital were available and revealed a rather large effusion in the lower portion of the left hemithorax. He had had a film taken on October 5, 1970, at the same hospital, and this was normal. On admission, there was no change except for probably slightly less fluid. All investigations, including bronchoscopy, examination of numerous specimens of sputum for malignant cells, and careful examination of fluid from 12 thoracenteses, failed to confirm the previous diagnosis of malignancy. A comment following the examination of pleural fluid on February 6, 1976, was interesting: "Groups of mesothelial cells showing reactive change with a predominantly lymphocytic exudate are noted. A review of the previous specimens of pleural fluid showed marked cellular abnormality which is probably secondary to inflammatory nonmalignant change." Two specimens of sputum revealed the presence of asbestos bodies.

A diagnosis of mesothelioma was now entertained, and left thoracotomy was carried out March 17, 1976. On opening the chest, a large effusion was encountered and 2000 ml. of slightly turbid yellow fluid were removed. When the rib spreader was inserted, a most unusual pathological process presented. The upper division of the upper lobe and the superior segment of the lower appeared normal. The inferior division of the upper lobe and the basilar segments of the lower lobe were shrunken, solid, and greyish in appearance. They were covered with multiple nodules of various sizes. This appearance was general on the chest wall, diaphragm, and pericardium. The diaphragm was covered by a thick whitish peel, on the surface of which there were innumerable small yellowish grey nodules. The pericardium was markedly thickened and, again, covered with nodules the size of green peas. The pericardial fat pad was replaced by what appeared to be dense tumour tissue, and the phrenic nerve was covered by a similar membrane. The posterior chest wall and the aorta were similarly studded with multiple nodules of various sizes. On the undersurface of the upper lobe, there was a thick whitish membrane. There were no enlarged nodes in the hilus nor in the mediastinum. A generous biopsy was obtained and the chest was closed. The postoperative course was uneventful.

In this case, the specimen was examined by Dr. W. A. Taylor, the pathologist at the Blanchard-Fraser Memorial Hospital. He found that sections showed collapsed lung substance with numerous asbestos bodies in some areas. Occasional high power fields contained 5-10 asbestos bodies. There was fibrous thickening of the pleura under each tumour nodule. The small area of lung substance showed collapsed lung alveoli with a columnar lining. Most areas of the tumour consisted of soft vascular papillary processes covered by cuboidal epithelium in which the nuclei were quite uniform and with a few mitotic figures. More solid areas of the tumour consisted of large cells with abundant cytoplasm and frequent large cytoplasmic vacuoles. Tumour of that appearance was present inside a large vein and fixed to part of the endothelial lining of that vein. It was felt that the appearance was consistent with a malignant tumour of the pleura, probably mesothelioma.

Sections were submitted to the Canadian Tumour Reference Centre and all the pathologists who reviewed the slides agreed that it was mesothelioma. The final report from the Centre was as follows: "The section shows thickened pleura with papillary tumour on its surface. No tumour is noted in the pulmonary parenchyma but there is mild peri-bronchiolar fibrosis which, taken with the presence of ferruginous bodies, is indicative of asbestosis. The tumour cells investing papillae vary from cuboidal to columnar form and show considerable nuclear irregularity. In several areas sheets of tumour cells are prominent. The histological appearances are strongly suggestive of diffuse mesothelioma and the thoracotomy findings are consistent with this diagnosis".

Following discharge, the patient was referred to Camp Hill Hospital were he was placed on Adriamycin therapy. The immediate results of the treatment were rather dramatic in that the effusion completely resolved and the lung re-expanded fully. Unfortunately, early in August 1976, progression of the tumour became evident with the recurrence of a massive left pleural effusion. This was managed successfully by closed drainage, but he has now a large collection of pleural fluid on the right. Large tumour masses are evident radiologically on the left. He requires repeated thoracenteses on the right for the relief of dyspnea in addition to continuous oxygen therapy. Pain, so far, has not been excessive.

Case No. 3

H. P. K. Aged 41. He was admitted to the Miller Hospital on February 9, 1976, complaining only of occasional soreness on deep breathing over the right side of his chest. He had been well until five weeks previously, when the pain began, and he did not see his physician until two weeks later. A roentgenogram was obtained at his local hospital, and a large effusion was noted in the right pleural cavity. Thoracentesis was carried out on two occasions, and approximately 300 ml. of clear fluid removed both times. The fluid was reported as showing no malignant cells. As the tuberculin test was strongly positive, he has felt to have a tuberculous pleural effusion.

The family history was noncontributory. All his working life, the patient had been a plumber and in the heating business; consequently, he had prolonged contact with asbestos. He had not smoked cigarettes since 1960. There were no significant past illnesses.

Except for the chest, the physical examination was normal. Examination of the chest revealed the cardinal signs of pleural effusion with diminished excursion, marked dullness and diminished breath sounds over the lower half on the right side. The roentgenogram revealed a rather large pleural effusion on the right, with no evidence of disease in the visualized lung parenchyma. The laboratory findings were inconclusive. Six successive thoracenteses were carried out and amounts of clear fluid varying from 300 to 600 ml. were removed on each occasion. In the meantime, because of the patient's age the absence of any evidence of malignancy, and the strongly positive tuberculin test, a diagnosis of tuberculous pleural effusion was entertained and antituberculosis chemotherapy begun. The fluid, following the last chest aspiration, did not recur and he was discharged on March 26, 1976, to continue chemotherapy at home.

Examination by his family physician ten days later, however, suggested re-accumulation of fluid, and he was readmitted on April 13, 1976. The recurrence of the pleural effusion was confirmed, and a thoracentesis was productive of 550 ml. of clear serous fluid. Again, the roentgenogram remained satisfactory until May 5, 1976, when fluid was noted again in the pleural space. While the laboratory

findings continued to be of no help and no asbestos bodies were noted in the sputum, it was felt that we were dealing with a condition other than tuberculosis.

On May 25, 1976, a right thoracotomy was carried out. A pleural effusion was encountered and approximately 1000 ml. of thin bloody fluid evacuated. A most unusual appearance then presented. On the lung itself, particularly the upper lobe, there was a thin fibrinous peel, but on the lower portion of the parietal pleura, on the diaphragm and on the pericardium, there were multiple nodules, whitish in appearance, and the sizes varying from that of a marble to a split pea. The pleura giving rise to these small tumours was considerably thickened. Grossly, this appeared to be a pleural mesothelioma. Situated in the fissure anteriorly between the middle and lower lobes, there was a solitary nodule. This was excised with a portion of the adjoining lung. In addition, several other nodules were removed from, respectively, the surface of the diaphragm, the pericardium, and the posterior chest wall. The lung was palpated and felt normal. The postoperative course was uneventful.

The specimens were submitted to Dr. W. A. Taylor, and he reported that sections of two blocks of the solid white nodules showed them to be composed of mesothelial cells. These occasionally lined spaces and were present as irregular sheets of cells with fairly uniform nuclei, quite scant cytoplasm and infrequent mitotic figures. There were some fibrous areas. Specimens were then forwarded to the Tumour Reference Centre in Ottawa. While their studies are not yet completed, the preliminary findings are in agreement with Dr. Taylor's and conclude that this is, in fact, a pleural mesothelioma. The patient was discharged June 4, 1976, to be admitted to the Victoria General Hospital, Halifax, for Adriamycin therapy which he is now receiving on a monthly basis as an outpatient. To date, the tumour is in remission.

DISCUSSION

To me, the most interesting feature in these three cases is that in a fairly busy thoracic surgical practice extending over the past 35 years, I had not encountered a mesothelioma of the pleura until 1974 and, since then, I have had three — two of them within the past six months. All three were male. In two of them there was definite contact with asbestos and, in one, the presence of asbestosis is documented.

The interesting association between asbestos and mesothelioma was first reported by Weiss in 1953[6]. He found that three patients with pleural mesothelioma had also pulmonary asbestosis. In 1960[7], Wagner found that 32 of 33 patients with diffuse mesothelioma of the pleura residing in the northwestern section of Cape Province of South Africa had been exposed to asbestos. Since these reports, there have been numerous additional ones which support the association between asbestos and mesothelioma. The evidence linking asbestos with mesotheliomas surfaced following the known association of this substance with pulmonary fibrosis and bronchogenic carcinoma.

While the evidence is largely epidemiologic, it is supported by the histological observation of such investigators as Hourihane[8] who found asbestos bodies in the lungs of six to seven patients with typical pleural mesothelioma. Experimental confirmation of the etiological factor has been supplied by Wagner[7] who was able to produce mesothelioma tumours in rats after asbestos implantation. Wagner's report in 1960 incriminated only one type of asbestos, crocidolite or blue asbestos which is found chiefly in South Africa, Australia, and Bolivia. However, additional reports, particularly in this country and in the United States, have implicated chrysotile or white asbestos. Found in Canada, Russia, and Rhodesia, it accounts for 90 percent of the world usage.

While such investigation seems to incriminate asbestos as the important etiological factor in pleural mesothelioma, many individuals exposed to asbestos never develop the disease, and it has been suggested that asbestos may be a cocarcinogen with some additional agent necessary for the production of mesothelioma. This is similar to the studies done on bronchogenic carcinoma where it was found that the risk of developing bronchogenic carcinoma is not increased by asbestos exposure alone. However, when asbestos exposure is combined with cigarette smoking, the risk of dying of bronchogenic carcinoma is about 92 times greater than in individuals who neither smoke nor are exposed to asbestos.

Another interesting finding is that no significant correlation can be found between the degree of exposure to asbestos and the occurence of mesothelioma. In fact, in some series, while the incidence of pulmonary fibrosis and cor pulmonale have decreased with smaller exposure to asbestos, the occurrence of pleural mesothelioma has increased. Unlike pulmonary asbestosis where the exposure to asbestos had been continuous and heavy, the exposure in mesothelioma in many cases appears to have been quite minimal.

SUMMARY

1. The subject of diffuse pleural mesothelioma has been reviewed.

2. The cases of three men who underwent thoracotomy at the Miller Hospital and in whom a diagnosis of pleural mesothelioma was made have been discussed. The first patient died three months after diagnosis; the remaining two are still living. Both were treated with Adriamycin. One, after a brief remission, now has rapidly extending disease; the second is in remission five months after diagnosis.

3. A summary of the evidence linking exposure to asbestos with pleural mesothelioma has been presented. □

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Correspondence

To the Editor:

Almost every day, Canadian consumers are warned by news stories originating in the United States about some problem with a food, drug, chemical or medical device. Often they become alarmed because the same product is marketed in Canada under the same brand name. What they do not realize is that the situation with the Canadian product might be completely different from that in the U.S., either because of different regulations governing these products in Canada or because the problem reported in the U.S. involves a situation that does not exist in the Canadian plant.

The Health Protection Branch of the Department of National Health and Welfare is anxious to put these stories in a Canadian perspective. The Branch is involved in the surveillance of foods, drugs, cosmetics, medical devices, radiation emitting devices and different chemicals found in a variety of products in Canada.

The Canadian Press normally checks with the Health Protection Branch on all wire stories. However, if you prefer to do your own follow-up, I will be most happy to provide your readers information on the Canadian situation.

Yours sincerely

N.-René Mercier,
Media Relations Officer,
Health and Welfare, Ottawa.

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Personal Interest Notes

Somewhat tardily but decidedly proudly, the Bulletin is happy to recognize **John H. Budd, M.D.,** President of the American Medical Association. A native of New Brunswick and a 1933 Dalhousie University Medical School graduate, Dr. Budd has specialized in family practice and obstetrics and gynecology in Cleveland, Ohio, since 1937 with enough time out to win five battle stars while serving with the U.S. Army in the European combat zone during World War II. Long active in professional society activities, Dr. Budd is the recipient of many awards in the medical field. Out of the office, however, he is also known as an accomplished pianist and former orchestra leader. To cap it all, friends in Halifax with whom he still keeps in touch regard him as one of North America's leading amateur authorities on baseball.

OBITUARIES

The death occurred January 5, 1977, of **Dr. John R. W. Bessonette** (36). Born in Halifax, he was a graduate of King's College and in 1966 he graduated from Dalhousie University School of Medicine. Our sincere sympathy is extended to his family.

Dr. Arthur D. Kelly, (75) Toronto Ontario, a former General Secretary of The Canadian Medical Association, died on December 13, 1976. He has been an Honorary member of The Medical Society of Nova Scotia since 1965. Our deepest sympathy is offered to his wife Gladys.

Dr. Hector J. Pothier (86) died January 7, 1977. A native of Eel Brook, Nova Scotia, he graduated from Dalhousie Medical School in 1919. Active in community affairs he served as a Member of The Legislative Assembly in the Provincial Government. In 1970 he was invested as a Knight of The Order of St. Gregory by Pope Paul VI. The following year The Medical Society of Nova Scotia honored him as one of their Senior members. We offer our sincere sympathy to his family.

NEW MEMBERS

The Physicians listed below have joined The Medical Society of Nova Scotia between December 1, 1976 and January 31, 1977. A most cordial welcome is extended by the Society.

Dr. Adrian S. Cheong	Kingston, Ontario
Dr. John R. Dill	Halifax, N.S.
Dr. David W. J. Dowse	Mahone Bay, N.S.
Dr. Ramesh Gupta	Halifax, N.S.
Dr. Navin M. Patel	Sydney, N.S.
Dr. Stephen Price	Yarmouth, N.S.

PARTIAL DISABILITY

You are reminded that Partial Disability Benefit is available as an optional addition to the Medical Society's Long Term Disability Insurance Program.

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