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Early Treatment of Acute Closed Head Injuries

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"EARLY treatment" in acute closed head injuries refers to the phase in the immediate post-traumatic period wherein therapy is designed to deal with the primary pathological lesion and any secondary complications as they develop, with the object of saving the patient's life. "Late treatment," in contradistinction, covers the period which follows the time during which life is in danger and during which treatment is devised in an attempt to prevent or alleviate any sequelae that may result from the acute head injury. In a previous communication¹ the treatment of the sequelae of acute closed head injuries has been thoroughly discussed and will not be mentioned further in this paper.

As has been pointed out before, the organic brain injury resulting from cranio-cerebral trauma may be of two types; (1) regions in which the cells are hopelessly damaged and incapable of recovery, and (2) regions in which the cells are partially injured but capable of recovery provided they are supplied with optimum environmental conditions and not subjected to the effects of further detrimental factors. Consequently, the prime object in the early treatment of these injuries must be the maintenance of optimum conditions at all times, a situation which implies the preservation of an adequate blood supply bringing sufficient oxygen and nutritive elements to support normal cellular metabolism and allow the processes of repair to take place. These optimum conditions may be adversely affected in the immediate post-traumatic period by a reduction of the circulating blood volume such as might occur in shock or as a result of interference with oxygenation by an obstructed airway, and emergency treatment must of necessity be devised to prevent the effect of these additional insults. Thereafter, interference with the circulation may result from secondary increases in intracranial pressure and the fundamental problem of therapy in this type of injury is then centred on the early diagnosis of space-occupying complications and their adequate treatment so that further embarrassment of the circulation may be prevented.

Because the most delicate evidence of failure to maintain these conditions is an alteration in the level of consciousness exhibited by the patient, it is essential that we have a plan of describing the patient's conscious state, at any one time, which is easily applied and easily understood, so that those subsequently observing the patient may determine at once whether any change is taking place. For this purpose we have chosen to emphasize the importance of the reflexes and the responses to painful stimuli—two of the most frequently used and readily interpreted signs currently in use in neurological examination.

In considering reflex changes we are interested primarily in examples of those reflexes which have cortical components and those which are mediated purely at a brain-stem level. In the first case a change in the plantar responses (and particularly the appearance of an extensor response) offers significant evidence of some pathological process effecting the pyramidal pathways, and in the second place corneal reflexes, which may be diminished or absent, demonstrate in these changes a lesion which is affecting the brain stem and which of course cannot be attacked directly by surgical means. The con-

sideration of the response to painful stimuli centres on the purposive nature of the response elicited, and, provided truly painful stimuli are applied for sufficiently long periods, there are rarely any doubts about the interpretation of this examination. In applying painful stimuli pressure over the supra-orbital nerve in the supraorbital notch, testicular pressure and forcible plantar flexion of the great toe are used to the exclusion of other tests and it is important to realize that these stimuli must be applied with sufficient force to cause an acutely painful reaction or otherwise the interpretation of the responses elicited is of no significance.

Many other features of the clinical examination of course are important in the correct appraisal of these patients but we are firmly convinced that the tests we have emphasized are essentially the most important and form a satisfactory basis for the immediate examination. Seldom will additional clinical procedures add significant knowledge to this original appraisal.

Table 1—Levels of Consciousness

| State | Reflexes | Response to Painful Stimuli | General Features |
|----------------------|--|---------------------------------|--|
| Full Consciousness. | Normal | Normal purposive motor response | Normal psychological adjustment to environment |
| Concussion | Vary | Varies | A dynamic rather than a static condition. |
| Confusion | Normal and active. | Purposive motor response. | Responses easily obtained but patient usually restless, irritable and disorientated. |
| Delirium | Normal and usually active. | Purposive motor response. | Patient drowsy and responses more difficult to obtain. Commonly restless when roused. |
| Stupor | Present — may show minor changes in the activity or nature of high level reflexes. | Non-purposive motor response. | Drowsiness marked and patient very difficult to rouse. |
| Semi-coma | Reflexes mediated at a high level absent or grossly altered and low-level reflexes usually diminished in activity. | No motor activity. | A grave state of ablation of all C.N.S. activity except that on a reflex level. |
| Coma | No reflex activity. | No motor activity. | Patient usually shows in addition changes in the vital functions of respiration and circulation. |

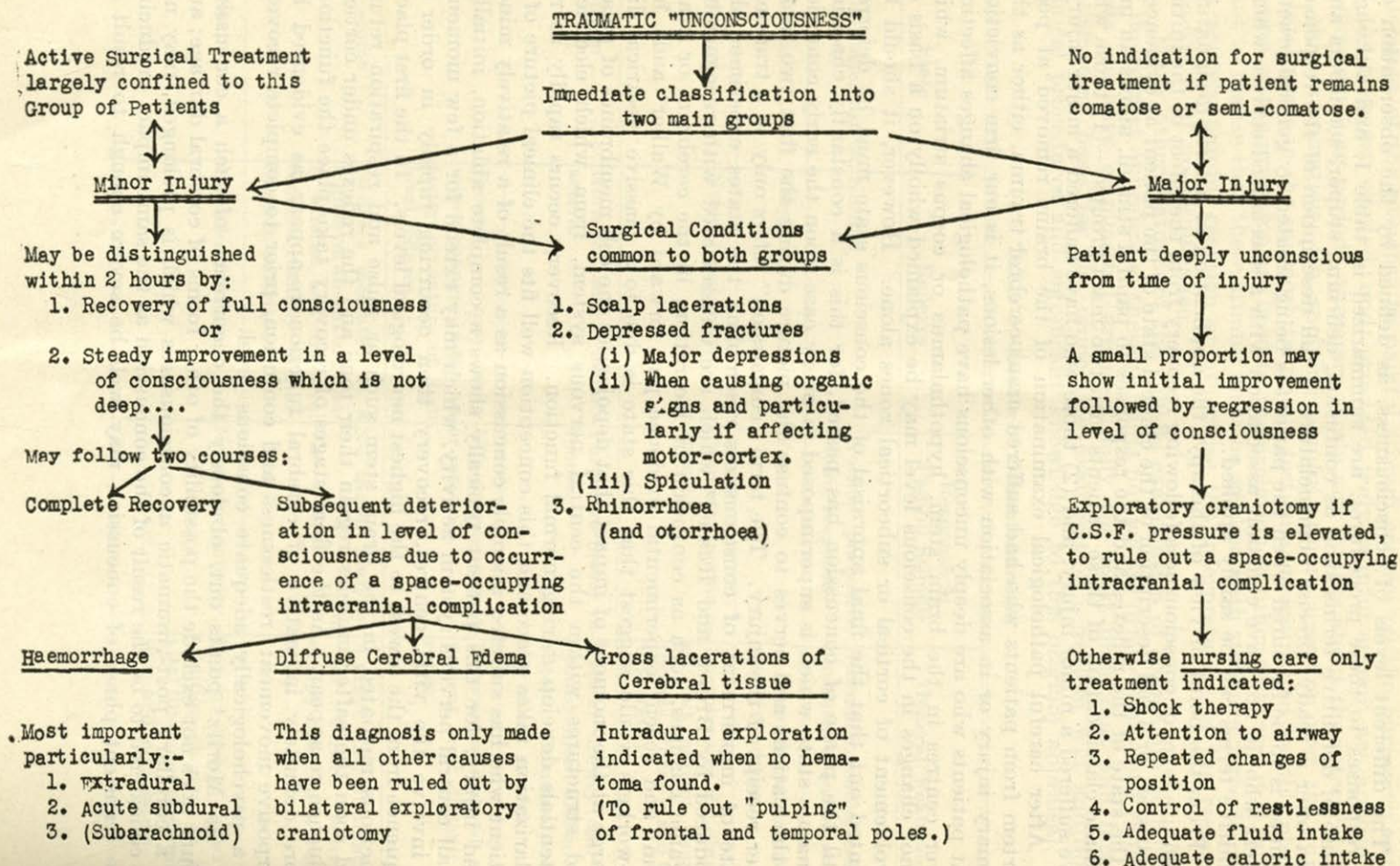
The different levels of consciousness, as defined by the observation of the responses to these procedures, are summarized in table 1, and although the use of definitive terms such as confusion, delirium, stupor, semicoma and coma offer a ready, precise nomenclature, a full description of the responses obtained is to be favoured when the patient is being treated by general practitioners who do not have constant association with a specialized service where definitive terms can be safely applied.

From the point of view of therapy, the application of a term designating a definite level of consciousness following recovery from the effect of the initial concussion, or a full description of the clinical state of the patient as evidenced by the state of the reflexes and the responses to painful stimuli, allows an immediate classification of these patients into two main groups;—(1) those who have suffered a minor injury, and (2) those who have suffered a major injury.

After careful pathological examination of the brains removed at post mortem from patients who had suffered craniocerebral trauma, either as the primary injury or in association with other lesions, it is our firm conviction that patients who are deeply unconscious have pathological changes affecting lower centres in the brain stem, hypothalamus or corpus striatum, while minor changes in the conscious level may be explained wholly on a basis of involvement of cortical or subcortical zones alone. However, it should be pointed out that the final appraisal of the conscious state must be deferred until the phase of concussion has passed, for this is a constantly changing dynamic state which is superimposed in every case upon the early condition of the patient and serves to confuse the picture during the first two hours after receipt of the injury. The term "concussion" refers only to a transient state of impairment of consciousness resembling the states experimentally produced by Brown and Russell² which are unassociated with recognizable organic changes, such as contusion or laceration, in the cerebrum or brain stem; and recent experimental evidence put forward by Walker³ and his co-workers would suggest that this state is due to a massive electrical discharge at the moment of impact that depolarises the cell membranes of polarized structures within the central nervous system, from which electrical potentials develop during normal function. Recovery occurs rapidly as repolarization takes place and this conception well fits the clinical picture of a patient who has suffered a simple concussion as a result of a relatively minor head injury, for this patient typically shows a complete ablation, initially, of all central nervous system activity, which may extend for a few moments to involve the vital centres, recovery then occurring rapidly in order of sequence from the lowest to the highest neurological levels. In the first place, functions mediated in the brain stem such as pulse and respiration return and soon thereafter muscles regain their tone and the reflexes under cortical influence re-appear. As the final stages of recovery take place the functions more definitely indicative of cerebral function re-appear as evidenced by purposive movement, restlessness and confusion, prior to complete recovery of a psychologically adequate conscious level.

As Moritz⁴ points out, obviously the occurrence of such a concussive injury does not exclude the possibility of other forms of cerebral damage; and as a corollary post-traumatic unconsciousness which is prolonged, may not be considered to be the result of the concussion as the same impact producing the transient phase of concussion may well be severe enough to result in

TABLE 2—TRAUMATIC "UNCONSCIOUSNESS"



cerebral damage in a degree sufficient of itself to cause changes in the conscious level of the patient.

As a ready guide it has been our practice to consider a patient whose response to painful stimuli is no longer purposive in nature (or in other words, one who is stuporous, semicomatose or comatose) after the phase of concussion has passed, as having suffered a major craniocerebral injury with presumptive evidence of involvement of the more important lower level centres. Consequently, if the patient shows gross impairment of consciousness immediately after injury which persists despite adequate treatment (implying the maintenance of adequate circulation and oxygenation) there is obviously no indication for surgical interference for the primary injury to these vital centres is not amenable to operative treatment. However, if the patient subjected to craniocerebral trauma is not deeply unconscious immediately upon receipt of the injury, thus suggesting that these lower centres have not been directly affected by the injury, and thereafter demonstrates increasing impairment of the conscious level, the change indicates that the vital centres are being affected by increasing intracranial pressure as a result of the development of secondary space-occupying complications these complications being supra-tentorial in almost every case and therefore subject to surgical attack. As always, it is the changing level of consciousness that demands clinical attention.

Because the treatment of these two types of patient, one with a major injury and the other with a minor injury, differs widely, they will be considered separately, an outline of therapy being presented in the accompanying table (table 2) which has been modelled on a plan originally devised by McKenzie⁵.

Minor Injuries

These patients should make an eventual complete organic recovery and active surgical treatment is largely confined to this group of patients, being designed to allay the effects of certain surgical conditions common to both groups of patients and, more importantly, to prevent the effect of increased intracranial pressure as a result of the development of secondary complications. The fact that the patient has sustained a minor injury may be distinguished within two hours by recovery of full consciousness or steady improvement in a level of consciousness which has not been at any time of any great depth. The subsequent course in these cases may progress to complete recovery or exhibit deterioration in the level of consciousness due to the occurrence of space-occupying intracranial complications, which fortunately, for the large part, are amenable to surgical treatment, so that the effects need not be permanent if recognized early and adequate treatment instituted at once.

The most important of these complications is massive intracranial haemorrhage and from the point of view of surgical treatment in the acute phase, this consists of two large groups—1. *extradural hematoma*, and 2. *acute subdural hematoma*. Their treatment consists primarily in recognition and drainage, and for this purpose exploratory burr-holes are made in the skull. In the event that an extradural hematoma is suggested by the occurrence of localizing signs or the presence of a fracture line crossing one of the middle meningeal grooves, the initial burr hole is commonly made over the pterion, although its location may be varied slightly by the site of the fracture line. In the event that an acute subdural hematoma is suspected, a subsequent

burr hole may be made in the region of the parietal eminence and in both cases an attempt is made to evacuate the clot by suction. In the case of an extradural hematoma, the bleeding point may be demonstrated and the vessel occluded by means of a silver clip or obliterated by electro-coagulation. The bleeding point is rarely found in acute subdural hematomata and simple evacuation of the clot is usually sufficient, combined with methods designed at making the brain rapidly take up the space left vacant by removal of the hematoma. In the event that the clots are not discovered in the region suspected, similar inspection holes should be made on the opposite side and when all four areas are found to be free of haemorrhage, an intradural exploration is indicated to rule out gross laceration or pulping of frontal and temporal poles, particularly if there is a considerable amount of bleeding within the subarachnoid space or evidences of organic signs suggesting the location of a specific lesion. Only after all these other complications have been ruled out in this manner is it permissible to entertain the diagnosis of "diffuse cerebral oedema" and to subject the patient to drainage of cerebrospinal fluid by lumbar puncture or methods of dehydration therapy. Rowbotham⁶ states that this diagnosis may be suspected when increased intracranial pressure is demonstrated in the absence of subarachnoid bleeding, although it also occurs in hydrocephalic states, these latter complications being, in our experience, extremely rare.

It should be pointed out that an extradural hematoma commonly shows no blood in the cerebro-spinal fluid, particularly if there has been a well-defined latent period, and when blood does occur in the spinal fluid in association with this lesion, it is most probably due to the occurrence of a contre-coup laceration of the opposite frontal or temporal pole.

Treatment of Diffuse Cerebral Oedema

Although in our own experience the occurrence of this complication has been exceedingly rare, its reported occurrence by many other observers leaves no doubt that it is a distinct entity, that will in some cases respond to suitable therapy.

In recent neurosurgical literature, there has been considerable controversy about the importance of this complication of acute head injury, and even when the diagnosis has been acceptable, this controversy is still apparent in the various forms of treatment advised, some considering drainage of cerebro-spinal fluid by lumbar puncture as a mere adjunct to dehydration therapy, whereas others believe that dehydration therapy is itself merely an adjunct to the drainage of spinal fluid by lumbar puncture. It is undoubtedly true that lumbar puncture is often difficult in restless patients and it is also an accepted fact that the cerebro-spinal fluid reforms rapidly after drainage so that the effect of removal of the spinal fluid is not prolonged and probably lasts no longer than an hour. VerBruggen⁷ points out the value of this drainage is debatable as the cerebro-spinal fluid acts as a fluid tampon against the swelling of the brain, and when it is removed merely allows the brain to expand more rapidly than it would in the presence of the uniform pressure that the fluid exerts. It is generally agreed that if the patient does not recover rapidly an initial lumbar puncture should be performed about twelve hours after injury. There is no advantage in performing the puncture before this time as the findings cannot be relied upon due to the fact that the oedema, or any

other cause of increased intracranial pressure, takes some time to develop and in addition, cases with small amounts of subarachnoid bleeding may not show evidence of this at an early period, because the blood may not have gravitated or diffused into the lumbar region. In the event that the pressure is found to be elevated significantly (over 200 mm.) our own plan of therapy is to remove fluid until the pressure has lowered to 75 mm. in an attempt to delay the recurrence of increased intracranial pressure as a result of the reformation of the fluid as long as possible, and dehydration is then used to slow up the formation of cerebro-spinal fluid and to control the tendency towards interstitial oedema formation. In ideal cases one can occasionally obtain a diminution in the volume of the cerebro-spinal fluid by dehydration alone, but this depends not only upon diminishing its rate of formation by the choroid plexuses but more importantly by increasing absorption from the arachnoid granulations which are often blocked by traumatic haemorrhages in these cases and it is usually found that the effects are not dramatic. Indeed Paterson⁸ throws doubt on the view that hypertonic solutions ever cause an enduring or appreciable diminution in intracranial pressure or of brain bulk.

It would undoubtedly be ideal if one could maintain a constant inhibitory effect on the formation of the spinal fluid and on the brain swelling by a slow, continuous, intravenous administration of a hypertonic solution, but this is rarely practical in restless patients particularly when they require so much active nursing care, and we have found it necessary to resort to repeated single injections. Consequently we routinely administer 50 to 100 c.c. of 50% glucose intravenously for rapid and immediate effect (sucrose has been given for its prolonged effect but we have recently abandoned its use due to the reports of injurious effects of its administration in this concentration on the kidneys). The effect of this intense dehydration lasts no longer than one or two hours and consequently its effect has to be reinforced also and we have been recently favourably impressed with the use of doubly concentrated plasma for this prolonged effect, administering 250 to 500 c.c. by slow intravenous drip if the condition of the patient permits this, after the restlessness has been controlled by sedatives.

Intestinal dehydration by mouth, or by retention enema has played no part in the treatment of acute head injuries in our hands, although these methods are occasionally of value in patients who have regained consciousness and are complaining of headaches or dizziness or showing drowsiness or dulling of mental faculties as a result of mild increases in intracranial pressure. No definite period at which the course of therapy should be repeated, can be adopted as a routine but each case must be judged by repeated lumbar punctures at four to six hourly intervals until the rate of return of the increased intracranial pressure has been assessed and a plan of therapy devised in keeping with this finding.

Gurdjian, Webster and Sprunk⁹ have denied that the limitation of fluids or their free administration causes any change in intracranial pressure, and in an attempt to prevent toxic dehydration and possibly uraemia as a result of this therapy, it has been our policy to provide an adequate fluid intake by duodenal tube, particularly after the first 36-48 hours.

There are certain contra-indications to this form of treatment of which one must be aware. In the first place, when the cerebro-spinal fluid shows evidences of severe subarachnoid bleeding, intravenous dehydration must be

carried out with care, as the haemorrhage may be increased by the elevation of the blood pressure; and certainly with increases of cerebro-spinal fluid pressure over 350 or 400 mm. of water, the removal of large amounts of cerebro-spinal fluid is contra-indicated, due to the danger of foraminal herniations. In these latter cases, if the patient does not respond satisfactorily to dehydration therapy, a ventriculogram is indicated to rule out a space-occupying complication (such as an intracerebral haemorrhage or a posterior fossa lesion) that has been missed by the previous bilateral exploratory craniotomy; or the presence of an internal hydrocephalus. If there is no evidence of such a complication, one must consider the possibility that the patient would be benefited by a sub-temporal decompression performed on the right side if there are no localizing organic signs.

It should also be pointed out that dehydration cannot be prolonged indefinitely, and probably no longer than three or four days at the outside, without causing serious effects on the general metabolic processes of the organism and possibly resulting in a toxemic reaction from over-dehydration of the tissues of the body which may be exhibited by elevation of temperature unassociated with other signs of brain stem pathology. In these cases, of course, the dehydration therapy must be stopped at once and attempts made to restore a more normal fluid balance in the body tissues.

Major Injuries

In this group of patients the subject remains deeply unconscious from the time of injury and provided there is no change in the level of consciousness, there is no indication for surgical treatment. However, a small proportion of the patients may show initial improvement followed by a subsequent regression in the level of consciousness, and if the cerebro-spinal fluid pressure is elevated, exploratory craniotomy is indicated to rule out a space-occupying intracranial complication. In the event that no such complication is discovered and the patient fails to respond to therapy designed at controlling diffuse cerebral oedema by the methods already described, a ventriculogram is indicated to rule out some obscure cause for the increased intracranial pressure. If no lesion amenable to surgical treatment is to be found, these patients often respond remarkably well to a sub-temporal decompression, usually performed on the right side (provided there are no organic localizing signs) as the left cortical area is commonly the dominant cerebral hemisphere. It should be pointed out that in order for the decompression to be of any value, it should include the entire portion of the temporal bone underlying the temporal muscle and the dura should be widely opened in a cruciate manner for the full extent of the bone defect, a minimum of 3" to 4" in the vertical and transverse planes.

If the spinal fluid pressure is not elevated significantly, specific nursing care is the only form of treatment indicated in these patients and it will be briefly outlined below.

Nursing Care of the Unconscious Patient

1. Treatment of Shock

As pointed out before, shock-like states occur in head injuries with evidences of failing cerebral circulation associated with cerebral anoxemia, so

that the ideal form of therapy consists in a transfusion of whole blood given at the same time as the intranasal administration of 100% oxygen in an attempt to increase the oxygen-carrying capacity of the blood stream as much as possible and thus create optimum conditions for the recovery of devitalized cerebral tissue. Even after any initial shock has been controlled, it is important that an adequate blood pressure be maintained throughout the immediate post-traumatic period in order that an adequate blood supply may be available for the nutrition of the vital centres and incidentally also for the production of a satisfactory urinary output.

2. *Maintenance of a Clear Airway*

Obstruction to the airway in these patients results not only in anoxemia as a direct effect, but as a result of laboured respiration tends to cause venous congestion and further embarrassment of the cerebral circulation. It is consequently important that one should prevent any obstruction by the tongue or by accumulation of mucous, blood, or cerebro-spinal fluid in the nasopharynx, and these patients are best nursed in a semi-prone position which allows the tongue to fall forward and accumulated fluid material in the nasopharynx to drain out of the corner of the mouth. In addition, the nasopharynx may be repeatedly aspirated by means of a suction tip and when there is any doubt as to the adequacy of the airway, it is then our custom to use a rubber airway of the Guedel type.

In cases who have already developed a bronchial obstruction with pulmonary collapse as a result of aspirated material, when they are first seen, bronchoscopy may be indicated as a means of removing the obstruction provided it can be performed by an experienced anaesthetist without unduly disturbing the patient. Unfortunately, simple postural drainage is not usually advisable in these patients for it results in increased intracranial pressure and may aggravate any tendency to intracranial haemorrhage or the production of other space-occupying complications.

3. *Repeated Changes of Position*

In the nursing of these patients, it is essential that the development of pneumonia or decubitous ulcers must be prevented at all costs, for this additional insult may be enough to tip the critical balance in cases that have already suffered a grave injury. These complications are best prevented by repeated changes of position, preferably at two-hourly intervals, care being taken at all times to keep the airway clear. If the patient is incontinent an attempt must be made to keep the bed dry and clean at all times and it is often possible by observing the restlessness and respiratory reaction that occurs in response to the stimulus of a distended bladder to anticipate the actual evacuation of the bladder and collect the urine without necessitating a change of bed linen.

In patients who are not in the deepest planes of unconsciousness we have found it impractical and unnecessary to resort to tidal drainage, and if premonitory symptoms are recognized, it is often possible by sitting the patient up or supplying a urinal to stimulate evacuation of the bladder. Repeated catheterization is to be condemned as the dangers of infection far outweigh in importance the difficulties of nursing care.

4. *Control of Restlessness*

Restlessness which causes intracranial congestion thus aggravating any tendency towards the production of a space-occupying complication, whether it be haemorrhage or oedema, must be controlled at all costs. We have found that the intramuscular or intravenous use of sodium luminal in three grain doses is the most satisfactory for general use, as it may be safely repeated at two-hourly intervals until a maximum of eight to ten grains has been given, and in most cases this will be sufficient to control the restless state. The only other sedative we have used routinely has been paraldehyde in doses of four to eight drachms given preferably with the duodenal feedings, as these patients are often intolerant to retention enemas. If the restlessness is not controlled by these methods, one should look for some specific cause, such as an unaccustomed bandage, pain from an unrecognized fracture, or unpleasant stimuli arising in a distended bladder. It is unwise to apply restraint to these restless patients as this only aggravates the activity and no harm is done by allowing the patient to move around in bed or even sit up, provided he is protected from falling by constant attention. In this way, he often succeeds in creating a state of physical fatigue which overcomes the restlessness in a physiological manner. In the event that the patient shows continual attempts to remove bandages or causes excoriation of the skin by scratching or rubbing motions, it is permissible to wrap the hands in absorbent cotton and loosely bandage them in the form of a mitten which tends to prevent these unusual activities.

5. *Maintenance of an Adequate Fluid and Caloric Intake*

These patients may remain unconscious for a considerable length of time, and consequently it is essential that the bodily nutrition be maintained throughout this period. This is best done by means of duodenal feeding, a fluid intake of about 2500 cc. daily containing a caloric equivalent of 2500 calories usually proving sufficient to maintain metabolism on a normal level. It is essential to supply an adequate protein intake and it is customary to prescribe a diet containing 100 grams of protein and approximately 250 grams of carbohydrate, the remaining portion being made up of fat in sufficient amount to supply the required caloric intake.

Once the swallowing and cough reflexes have become firmly re-established we prefer to remove the duodenal tube, as pharyngeal irritation, oedema and occasionally ulceration with haemorrhage have occurred in our hands. Feeding may now be carried out by means of a syringe to which a small rubber tube is attached and inserted at the corner of the mouth, a fluid feeding being allowed to run into the mouth in small quantities so that the patient may swallow the material once the pharynx is stimulated without danger of choking from excessive administration. If care is taken in this procedure an adequate fluid and caloric intake may be easily maintained.

6. *General Observation of the Patient*

It is customary to have the temperature, pulse, respiration and blood pressure recorded every half hour or every hour during the immediate post-traumatic period, but it is important to realize that these observations are particularly significant in that they assure the fact that the patient is disturbed at these points by the nurse or attendant making the observaton with conse-

quent assurance that any changes in the conscious level will be noted as they occur. Although changes in the records obtained represent confirmatory evidences regarding the occurrence of secondary complications, the primary feature to be emphasized is a change in the level of consciousness and this continual attention is the best means, of which we are aware, whereby these changes may be recognized at an early date.

Surgical Conditions Common to Both Groups

War-time experience has shown conclusively that the critical six-hour period, at which contamination becomes infection and thus operation dangerous, can be greatly lengthened with the advent of penicillin and sulfonamide drugs and the realization that complete excision of the devitalized tissue is essential in any operative procedure. As a result of this realization, compound wounds no longer represent surgical emergencies and attention can be paid to the general condition of the patient, with delay in the operation until this general condition will allow the performance of a complete procedure. However, although the period can be considerably prolonged, it is ideally best not to carry the pre-operative preparations beyond a 12 to 15-hour period and in most cases this is more than sufficient to correct any shock-like state or respiratory obstruction that existed when the patient was first seen.

Local anaesthesia is the method of choice and is fortunately applicable in the great majority of cases. However it is occasionally found impossible or unsafe to control restlessness, or the patient may be extremely uncooperative, and in these cases a general anaesthetic becomes necessary. We prefer that intubation be carried out as a routine and any anaesthetic is suitable that allows a high percentage of oxygen to be continually supplied to the damaged tissues. Cyanosis and oxygen lack are to be avoided at all costs, for the cells may be hopelessly damaged by any further insult. We are also convinced that the use of intravenous pentothal should be condemned, possibly even in the most experienced hands, for these patients have passed through a stage in which protective reflexes have been in abeyance and often still have an accumulation of aspirated mucoid material in the larynx which seems to act in an irritating manner rendering the larynx even more sensitive, so that the tendency to laryngeal spasm is greatly increased. In this type of case spasm and obstruction of the airway, often associated with extreme cyanosis, is a catastrophe of the highest order and represents a risk that never need be taken.

1. *Scalp Lacerations*

It is certainly true that the scalp is supplied with an excellent arterial supply and that lacerations will heal promptly in the great majority of cases, but this is no excuse for the scant attention that is often paid to these wounds, and one needs but once to see a sub-galeal empyema resulting from a simple scalp laceration to appreciate the danger of this tendency to neglect fundamental surgical principles when dealing with these types of lacerations. An area of scalp should be shaved cleanly for at least an inch around the margins of the laceration, and the edges of the wound separated to expose the depths of the laceration, for it is only in this manner that retained materials will be completely removed, and occasionally one may discover a depressed fracture that would otherwise have escaped attention if the wound had been subjected

only to cursory probing. Provided the skull is intact, it is sufficient to close the scalp with a single layer of interrupted non-absorbable sutures.

2. *Depressed Fractures*

These fractures are to be elevated when they are causing increased intracranial pressure producing organic signs, or when there is danger that post-traumatic epilepsy will result. Consequently, there are three types of depressed fractures which require surgical treatment:

(i) Major depressions of sufficient degree to cause of themselves an increase in the intracranial pressure.

(ii) Localized depressions when causing organic signs and particularly if they are affecting the motor cortex. If these fractures are left without elevation, there may be scarring in the underlying cortical region which will, in later years, result in the formation of an epileptogenic focus.

(iii) Spiculation of the depressed fragments, particularly those of the inner table. These sharp fragments have almost invariably penetrated the dura and caused a laceration of cortical tissue in the subjacent area of the cerebral hemisphere and are consequently particularly prone to be followed by the proliferation of meso-dermal elements arising from the neighbouring blood vessels on the surface of the brain, resulting in the formation of a cerebral scar attached to the lepto-meninges and capable of producing an epileptogenic focus.

It has been the custom in the past to stress the danger in immediate operation of opening the subarachnoid space and disseminating infection in these cases of compound depressed fractures of the skull, but in view of the results obtained in war-time surgery, this position is no longer tenable, and immediate treatment may be carried out as soon as the general condition of the patient permits. This is particularly true since the advent of penicillin and the use as an adjunct in therapy of one of the sulfonamide drugs.

Although it has been, in the past, a sound surgical principle that emergency operations should consist only of those procedures necessary to save the patient's life, recent advances in surgical technique and improvements in methods of resuscitation and anaesthesia have made possible certain modifications of this limited approach. The advent of an easily prepared element such as tantalum means that in the great majority of cases cranioplasty can be carried out without prolonging the operation more than ten or fifteen minutes in those types of comminuted fracturing where it is impossible to elevate the depressed bone and a cranial defect remains after the removal of the fragmented area of the skull. We believe that all such defects should be repaired at the time of the initial operation unless the patient's condition forbids even this slight extension of the operating time or there is an overwhelming danger of infection. In this manner, secondary operations for organic or psychological reasons or for the treatment of post-traumatic epilepsy may be rendered unnecessary.

3. *Rhinorrhoea (and otorrhoea)*

These conditions are important because of the frequency with which meningitis may occur as a complication, and treatment is devised to prevent the onset of this infection of the subarachnoid space.

Fortunately leakage of spinal fluid through the ear commonly becomes arrested spontaneously and rarely is surgical intervention indicated, an attempt being made to control the infection by intra-spinal and systemic penicillin therapy with the addition of one or other of the sulphonamide drugs.

There has been considerable controversy however, about the treatment of cerebro-spinal fluid rhinorrhoea in the acute stage, some observers maintaining that the danger of meningitis is so great that surgical repair should be carried out as soon as the patient has recovered from the initial shock-state. VerBruggen⁷ on the other hand has recently stressed the value of postural drainage in an attempt to avoid the possibility of cerebro-spinal fluid that has escaped into the nasal passages becoming contaminated and then returned in the presence of any blockage, to the clean cranial cavity with resultant meningitis. He points out that this complication is particularly apt to occur if there is any obstruction to drainage at this stage. He also suggests that defects on the posterior wall of the frontal sinus associated with rhinorrhoea may be closed by using the brain as a tampon, putting the patient with his head down and forward so that the brain covers up the slight tear in the dura and is made to adhere to the surface of the frontal sinus.

Our own experience with the efficacy of penicillin and sulfonamide therapy in combatting these post-traumatic meningeal infections has led us to adopt a reasonably conservative attitude, in that we believe an attempt should be made to obtain spontaneous closure of the defect before resorting to surgical treatment, although it is readily admitted that occasionally the rhinorrhoea may recur after many months or years. If it persists after an adequate trial of conservative treatment and the patient has made an otherwise uneventful recovery, surgical treatment is usually carried out after three weeks or a month, with closure of the defect using a patch of fascia lata, if it cannot be closed readily by simple suturing. The intradural approach is reserved for those cases involving the ethmoidal areas (usually posterior in position, and not easily accessible otherwise), this type of approach having the additional advantage of allowing inspection to both sides of the midline.

Summary

1. Although severe craniocerebral trauma results in hopeless damage to some areas in the central nervous system, it is pointed out that cells in other areas are capable of recovery provided optimum environmental conditions are maintained. This involves the maintenance of an adequate circulation providing sufficient oxygenation and nutrition to support normal cellular metabolism and allow the processes of repair to take place.
2. Active treatment is designed to prevent the deleterious effects on the cerebral circulation which results from the occurrence of secondary space-occupying complications.
3. As the earliest and most delicate evidences of such complications are exhibited by changes in the conscious state, a simplified plan is presented whereby the level of consciousness may be recorded at any one time, thus enabling subsequent observers to assess any change that is taking place.

4. The plan is based primarily on the activity of the reflexes and the response of the patient to truly painful stimuli. Recording of the level of consciousness may be either descriptive or definitive, although the former method is to be preferred for general use, a precise nomenclature requiring specialized knowledge.
5. It is pointed out that, following recovery from the effects of the transient initial concussion, these patients may be at once classified on the basis of their conscious state as having suffered a major injury or a minor injury.
6. Active surgical treatment is largely confined to the group who have suffered a minor injury although certain surgical conditions may be common to both groups. In the case of major injuries, nursing care as outlined, is the only form of treatment indicated in the great majority of cases unless it is felt that recovery is only possible provided a space-occupying complication can be adequately treated.
7. Intraeranal haemorrhage is the most common secondary space-occupying complication and it is important to realize that a diagnosis of "diffuse cerebral oedema" may not be entertained, nor the patient subjected to dehydration therapy or the removal of cerebro-spinal fluid, until all other space-occupying lesions have been eliminated following bilateral exploratory craniotomy.
8. The possibility of an intradural cerebral laceration with local intracerebral bleeding and reactive oedema must always be borne in mind when no extradural or subdural hematoma are discovered at the time of craniotomy. These lesions most frequently occur at the temporal and frontal poles and are commonly contre-coup in origin.

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Some Observations on Congenital Heart Disease*

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SINCE the year 1938, three types of congenital heart diseases have been successfully treated by surgery: (1) Patent ductus arteriosus; (2) Coarctation of the aorta; (3) Pulmonary stenosis and atresia. Each of these may exist as a single anomaly, but more commonly is found in combination with other congenital defects in the heart or elsewhere in the body. Pulmonary stenosis characteristically is present as one of the four anomalies that constitute the Tetralogy of Fallot.

Patent Ductus Arteriosus

In the foetus most of the blood from the pulmonary artery is delivered to the aorta through an embryological vestige, the ductus arteriosus. Soon after birth it should cease to function and remain as the ligamentum arteriosum. Occasionally however, this communication is patent, with the result that varying amounts of arterial blood are returned to the pulmonary circulation or vice versa.

In an otherwise healthy individual small openings may produce no symptoms. These people often suffer little or no inconvenience. Severe physical strain or illness may however, precipitate symptoms. The incidence of bacterial endocarditis is much higher in this group.

When the communication is large, as much as 40-75% of the blood expelled by the left ventricle is returned to the left ventricle without having passed through the right side of the heart (Eppinger, Burwell, Gross), thus the left ventricle expels 2-4 times that of the right. The left ventricle is overworked, becomes hypertrophied and possibly later dilated.

"Studies on circulation explain and support the clinical observation that patients with failure or diminished reserve are benefited by closure of the patent ductus."—Blalock.

Symptoms and Signs

As has been mentioned above, those who have little or no arterio-venous shunt, may not present cardiac symptoms, especially in infancy and during the early years of life. With large communications, indications of serious cardiovascular lesions are present, especially dyspnoea on exertion, retardation of growth, tachycardia, or a pounding cardiac impulse. Orthopnoea, peripheral oedema cyanosis, and other signs of cardiac failure are late events. Cyanosis is uncommon, except in the presence of failure when the flow of blood through the ductus is reversed, due to the high venous pressure.

In the presence of a large communication the diastolic pressure is low. When the pulse pressure is high, signs suggestive of aortic regurgitation may be present, viz.—capillary pulsation, the water-hammer collapsing type of pulse. There is usually no clubbing or polycythemia. The circulation time is frequently prolonged.

The murmur is almost invariably loud, harsh, with a systolic accentuation quite characteristically continuous, rumbling—commonly described as

the "humming top" "machinery" murmur. It is usually loudest in the second and third interspace to the left of the sternum. It may be transmitted widely—to the neck, apex, axilla and between the scapulae. It may be accentuated or may be overshadowed by the murmur. A systolic thrill may be felt in the second or third interspace to the left of the sternum. Some of these features may be absent if the shunt is a small one.

The EKG is commonly normal, never indicate right axis preponderance, and occasionally show left axis deviation (Gross et al).

"The true hilar dance is probably due to an associated pulmonic valvular incompetency or insufficiency." (Schwedel).

The fluoroscope and X-ray, though they do not always present characteristic signs, may provide valuable information. In the presence of a large ductus there is visible pulsation of the pulmonary artery and the arteries within the lung fields. There is increased pulsation of the aortic arch. The left auricle and the left ventricle may be enlarged.

Injections of diodrast and cathrization of the heart are of great value in obtaining information concerning the nature and number of lesions present in the heart. The ductus itself is not visualized.

Treatment

An operation for closure of the patent ductus was first described by Munroe and attempted by Streider in 1907, but the first successful closure was done by Dr. Gross in 1938.

For a number of years surgeons did not consider closure of the ductus, due to the prevalent belief that it usually existed in combination with a number of other congenital cardiac anomalies. With added new methods of investigation, notably intravenous injection of radio-opaque materials and catheterization of the heart, more accurate diagnoses have been possible.

Dr. Abbott states that patent ductus occurs twice as often in combination with other congenital lesions, than it does as a single anomaly. Dr. D. M. Fleet, Texas, has found it as a single cardiac defect in 25% of cases. Keyes and Shapiro estimate that there are 2,000 persons in U. S. A. who have this congenital defect.

During the pioneering days in this surgical field, Dr. Gross considered sub-acute bacterial endocarditis, contraindication to operation, but in recent years when chemotherapy fails, the existence of this complication is frequently regarded as one *indication* for surgical closure. Surgical closure in subacute bacterial endocarditis was first proposed by Dr. Wolff in 1939. October, 1946, Dr. Gross had operated on ten patients with blood positive for strep. Viridans. Three showed no change, seven were cured.

In October, 1946, Dr. Gross reported a mortality of 3.8% on a group of 130 patients, ages ranging from 11 months to 47 years. Excluding adults, his mortality was 1.1%. In view of this low operative mortality and due to the possibility and probability of ultimate serious complications, he feels that the operation should be undertaken in all young individuals with this defect.

In the older group (over 25 years), more technical difficulties are experienced due to sclerosis of the regional vessels, which makes "handling of them more hazardous." The optimum age for operation is four to six years, with

a range of two years to twenty-five years, though successful closure has not infrequently been done at a more advanced age.

In the presence of other anomalies, especially with pulmonary stenosis, a patent ductus may improve the circulatory dynamics, consequently at operation a temporary or trial closure is done, to observe the effect of the procedure, at which time the murmur and thrill should disappear. (B. T. Edye, Australia).

Summary and Conclusions

Complications and sequellae, especially subacute bacterial endocarditis, are frequent. The operative mortality is low (1.1%). Patent ductus arteriosus not infrequently occurs as a single congenital cardiac anomaly (25%) (Fleet).

Surgical closure may improve the cardiac dynamics in the presence of other congenital cardiac lesions.

Surgical closure should be done on all patients within the age group where the existence of other pathology, especially within the heart, does not weigh against this procedure.

Coarctation of the Aorta

Narrowing or complete occlusion of the aorta may occur in the abdomen, lower thoracic segment or in the arch.

Investigators have found that this anomaly occurs in 1-1500 routine autopsies (Gross et al). Dr. Abbott found it as a primary lesion in 79 cases and associated with other congenital cardiac anomalies in 63, the most frequent of which was bicuspid aortic valves. It is commoner in males, ratio of 4-1.

Two types are described:

- (1) The infantile, in which there is narrowing or obliteration of a considerable length of the aorta. These individuals usually die in early infancy.
- (2) In the adult type there is narrowing of a short segment of the arch (usually one cm. or less in length) at or just distal, and rarely proximal, to the insertion of the ligamentum arteriosum.

In 74% of cases, death occurs from rupture of the aorta. Other fatalities occur from bacterial endocarditis, aortitis, congestive failure and intracranial hemorrhage. Rupture of cerebral vessels may be explained by the frequent occurrence of hypertension in the upper half of the body, also by the tremendous collateral circulation with or without aneurysmal formations.

Symptoms and Signs

The symptoms vary with the degree of coarctation. Where the constriction is slight, the individual may not suffer any inconvenience and no physical signs may be present. With marked narrowing there are retardation of growth, retardation of mental development, dyspnoea on exertion and cyanosis. The patient may complain of headaches, flushing, buzzing, sensations of warmth, or fullness of the head or upper extremities, a pounding sensation. Epistaxis may occur. These symptoms are aggravated by bending or stooping.

Circulation to the lower limbs is commonly impaired, producing tingling, numbness, decreased warmth, loss of color, pain, intermittent claudication.

Occasionally the left arm (rarely the right) shows the same phenomenon, due to the encroachment of the coarctation on the orifice of the left subclavian artery.

Abnormal pulsations of the arteries in the upper half of the body may be seen or felt, especially in the axillary arteries and in the vessels medial and inferior to the scapulae (Gross et al).

The retinal vessels may be full and tortuous (Reifenstein et al).

The thyroid arteries may be enlarged. Hyperthyroidism and elevated basal metabolic rate have been reported.

The murmur of coarctation is systolic in time, heard over the left upper upper precordium and in the back, between the scapulae and over the lower dorsal spine especially on the left side. Some observers mention that if the murmur is heard only in the back, or if it is louder in this area, this finding suggests coarctation. Loud murmurs are widely transmitted and may be accompanied by a thrill. In the presence of atresia, murmurs may be absent.

Gross states that, "murmurs are extremely variable and may be misleading." They frequently accompany other congenital defects such as bicuspid aortic valves, interventricular septal defects or patent ductus. Tortuous collateral vessels may initiate systolic or even continuous murmurs. Diastolic murmurs are not found in uncomplicated coarctation of the aorta.

One of the most characteristic signs is the difference in blood pressure between the upper and lower extremities. That recorded in the arms may be normal, or as is frequently found, elevated. The pressure in the legs may be so low as to be unobtainable.

Pulsations of the arteries in the lower half of the body may be markedly reduced or absent—aorta, femoral, tibial, popliteal and dorsalis pedis arteries.

Radiological findings are very valuable in confirming the diagnosis. Erosion or notching of the ribs is found in 75% of cases and is most common in the second and third decades of life, though it has been observed in very young children.

The ascending aorta is dilated. Occasionally some dilation beyond the constriction is seen. The aortic knob is reduced in size, even in the presence of hypertension. The pulmonary artery is not prominent. Hypertrophy of the left ventricle is found in practically all cases (Reifenstein et al). It may be possible to demonstrate the narrowing by intravenous injection of diodrast.

Treatment

Surgery offers the only hope of cure or improvement of this condition. Dr. Gross to date has operated on eighteen cases with two deaths (personal communication). One of the two fatalities occurred in his early operations, and he felt that this was caused by removing the clamps too quickly.

In all of his cases, Dr. Gross has been able to do an end to end anastomosis of the aorta. Dr. Blalock suggests that this may not be possible in all patients, due to the position or length of the coarctation, in which case the left subclavian would be the artery of choice. It is interesting to note that when the latter operation was done in experiments on normal dogs, they frequently died or developed weakness or paralysis of the posterior part of the body. In human beings with coarctation, this does not occur, due to the extensive, compensatory collateral circulation that has formed. This

collateral circulation also permits the temporary obstruction to the aortic stream during operation.

Summary and Conclusions

Diagnosis should be made in early life and should be accurate to facilitate operative correction if necessary.

Untreated complications are frequent, viz., hypertension, cardiac hypertrophy and failure, apoplexy, rupture of the aorta and subacute bacterial endocarditis.

Early mortality—adult type mean age at death 70 cases 33 years; infantile type mean age at death $1\frac{3}{4}$ months.

Operative mortality 11%.

The Cyanotic Group with Pulmonary Stenosis and Atresia

Most of the information that I now present has been gathered from the writings of Dr. Blalock. His results have been most encouraging. (Dr. Blalock's operative mortality is 15%.)

Here is included a heterogeneous group, of which the Tetralogy of Fallot is the commonest. In Dr. Abbott's series, pure pulmonary stenosis occurred alone in but 16 cases. Surgery has been successful in alleviating those in which pulmonary stenosis is a feature.

In the tetralogy of Fallot a combination of cardiac anomalies are found:—(1) pulmonary stenosis; (2) dextraposition of the aorta; (3) interventricular septal defect; (4) hypertrophy of the right ventricle. This combination of defects is the commonest cause (85%) of cyanosis resulting from congenital heart disease in children over one year of age and in adults. A veno-arterial shunt occurs, due to the abnormal pressure within the right ventricle resulting from stenosis of the pulmonary artery.

Symptoms and Signs

Cyanosis is marked in this defect and is due largely to the large absolute quantity of reduced hemoglobin, polycythemia and capillary dilatation. *With the prolonged Cyanosis* there is marked clubbing of the fingers and compensatory polycythemia. The red blood count may reach 10 million. Physical examination shows marked right ventricular hypertrophy. A loud systolic murmur is present all over the precordium, best heard in the pulmonary area and generally accompanied by a systolic thrill in this region. The electrocardiogram characteristically shows a *marked* right axis deviation. By X-ray the heart resembles a wooden shoe described as "coeur-en-sabot." The superior vena cava is dilated and the aortic knob is not either small or not visualized. The pulmonary artery segment is small which contributes to the narrow waist-like upper cardiac configuration. With the advent of angiocardiology as done by Sussman of New York with radio opaque dye (70% diodrast) a better demonstration of the heart chambers is possible. This technique holds much promise for the future.

Treatment: The original conception of a way to improve these unfortunate people first occurred to Dr. Helen Taussig she, in conversation with Dr. Blalock suggested that these patients would be benefited if a larger quantity of blood could in some way be diverted to the lungs. To accomplish this a large systemic artery would have to be divided, with a major disturbance to the part

supplied. Secondly, the pulmonary artery would of necessity have to be occluded during the operative procedure, with a resultant increase in cyanosis in the already cyanotic child.

The objective of the operation is then to increase the flow of blood through the lungs.

In the literature are reports of a few attempts to enlarge stenosed areas in the aorta and pulmonary artery by digital dilatation and by the use of a tenatome knife. Generally speaking most of these results were very poor.

Drs. Blalock and Taussig then originated a new operation to augment the pulmonary circulation. They proposed to anastomose one of the great systemic vessels with the pulmonary artery.

In the pre-operative investigation every effort is made to determine the nature and degree of all cardiac anomalies, by X-ray, catheterization of the heart, blood counts, hemoglobin and haematocrit readings, oxygen per cent saturation and capacity of the arterial blood.

Two outstanding diagnostic features were required before decision to operate:

- (1) "Roentgenological evidence that the pulmonary artery was small in size."
- (2) "Clinical and roentographic evidence of absence of congestion in the lung fields." Blalock.

The operative approach is through the third intercostal space anteriorly, right or left side, depending on which vessel is selected for anastomosis. Several of the great systemic arteries above the aortic arch have been used—right subclavian, left subclavian, left common carotid and the innominate. If possible the right subclavian is used, since less kinking of the artery occurs when the left subclavian and the left common carotid are chosen, there tends to be a more acute angle at the site of their origin from the aortic arch. For these reasons the approach is usually through the right side. If diversion of a large quantity of blood is urgently required, the innominate may be used. The end of the systemic artery is anastomosed with the side of the pulmonary artery.

Cyanosis increases during the operation but is quickly relieved when the circulation is restored.

If a large amount of blood has been lost during the operation, plasma is administered. If, however, there has been little bleeding and polycythemia is present, blood is removed at the conclusion of the operation.

It is interesting to note that following ligation of the subclavian artery, the circulation to the arm remained adequate; there resulted little, if any, disturbance of sensation or motion. The arm on the operated side was slightly cooler. In some cases the radial pulse returned. This phenomenon again emphasizes the ability of the body to re-establish vast collateral circulation.

Up to November 1, 1945, Dr. Blalock had performed 57 operations on 55 patients with 12 deaths. Three have shown little or no change, 41 are improved. This is a mortality of 22%. Recently I have learned that this figure has been further reduced to 15% (Gross).

Attempts have been made to produce a direct A-V shunt, from the aorta to the pulmonary artery above the stenosed area. This procedure is still in the experimental stage.

Surgeons have doubted that this artificial communication would remain open. Potts, Smith and Gibson have found that in dogs a good communication existed 81 days after operation. They have tried this procedure on three patients (ages 21 months, 8 years, and 11 years). Two were much improved and one died.

In patients with pulmonary stenosis with or without other cardiac anomalies, the mean age at death is approximately nine years.

Summary and Conclusions

In many patients with pulmonary stenosis or atresia occurring alone or in combination with other cardiac anomalies, surgery offers the only hope for improvement.

Mean age at death in this group is approximately nine years.

Operative mortality 15%.

Every effort should be made to determine the nature and extent of all congenital anomalies with cyanosis.

Diagnoses should be made *early* in childhood, due to short life expectancy, in untreated cases. Youth facilitates operative procedures.

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Gastric Carcinoma*

A Comparative Review of the Origin, Diagnosis, and End-Results in 583 Patients

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AFTER the third decade, neoplasm is second only to cardiovascular disease as a cause of death. Since about one-fifth of this mortality is due to carcinoma of the stomach, the subject is of prime importance and worthy of constant, repeated analytical study.

In a review covering 444 patients with carcinoma of the stomach discharged from the Fourth Medical and Surgical Division of Bellevue between 1919 and 1938, the dismal outlook was pointed out (2). The purpose of this review is to investigate whether the past 7 years has altered the status of the patient with gastric carcinoma. From 1939 through 1945, of 171 patients discharged with the diagnosis of carcinoma of the stomach, 32 were eliminated because of insufficient diagnostic proof.

The diagnosis in the remaining 139 cases was verified by pathological specimen and unquestionable X-ray evidence. Of these 76 (64.3%) were considered inoperable, following admission. The reasons for inoperability were: 14 were moribund; 22 had extreme cachexia or senility; 28 showed extensive lesions with metastases; and 12 refused operation. Forty-three per cent of these patients died while on the wards.¹

The remaining 51 cases (36.7%) were considered operable. An effort was made to do an exploratory operation in every case in which any hope for improvement by surgical intervention was thought possible. Exploratory laparotomy in 22 cases (15.5%) proved that no further operative measure could be undertaken. On 10 patients a palliative procedure was performed, as temporary relief for obstructive lesions.

In only 19 patients was gastric resection feasible. Whenever possible, wide resection was performed, even though evidence of malignant extension, such as enlarged nodes (which were probably neoplastic) were present. This group had a mortality of 62.3 per cent. Resection was possible in 13.7 per cent of the total number of cases, and in approximately 38 per cent of the operable cases. Only 7 patients (5%) were discharged from the hospital as possible cures.

The symptoms in our present series are approximately the same as those found in our previous series of patients: Pain, loss of weight, vomiting, and weakness remain the predominant reasons for seeking medical care and hospitalization. In an effort to evaluate further, we have attempted to divide the relative time of the onset of the various signs and symptoms (Table I) into "early" and "late." Pain and loss of weight head the list of early complaints, while cachexia and a palpable mass are the common late findings. The value of this compilation is questionable. Many of the signs and symptoms which are early for one patient are late for another. It is clear that it

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1. For purposes of this study, it is considered a mortality if the patient does not leave the hospital, regardless of the cause of death or length of time following operation.

will be necessary to find and utilize means and methods other than these signs and symptoms if we are ever to diagnose gastric carcinoma early.

This conclusion is further borne out by a study of the relationship between the duration of the signs and symptoms, the operability, and the resectability of our patients (Table II).

As was also shown in our previous studies, a graphic representation of the percentage relationship between operability, resectability, and the lapse of time after the patient's first complaint does not influence the possibility of cure. Resectability cannot be prognosticated by what we now consider

Table I.—Signs and Symptoms*

| Sign and Symptom | Early | Late | Total | Percentage |
|------------------------------|-------|------|-------|------------|
| Pain (epigastric discomfort) | 123 | 11 | 134 | 96 |
| Loss of weight | 90 | 27 | 117 | 84 |
| Vomiting | 51 | 36 | 87 | 62 |
| Palpable mass | 9 | 58 | 67 | 48 |
| Weakness | 34 | 29 | 63 | 45 |
| Anorexia | 51 | 11 | 62 | 45 |
| Cachexia | 4 | 34 | 38 | 27 |
| Nausea (only) | 23 | 5 | 28 | 20 |
| Eructation | 22 | 2 | 24 | 17 |
| Hematemesis | 6 | 12 | 18 | 13 |
| Melena | 4 | 13 | 17 | 12 |

*Signs and symptoms due to metastases or extension of malignancy, i.e. jaundice, ascites, etc., have not been listed.

symptomatology. In the overwhelming majority of cases, our present criteria allow us to make a diagnosis only in the late cases, and as we continue to depend on inadequate methods, it is only by purest accident that early cases come to operation. Since waiting for clinical signs and symptoms to appear has resulted in low rates of operability and resectability regardless of their duration, further attempts to increase our diagnostic accuracy dependent on complaints of the patient are doomed to failure.

Gastric Analysis

Gastric analysis was performed in 63 cases. Fifty-five (87%) showed marked hypoacidity or achlorhydria, 6 (8%) showed normal acidity, and 2 (3%) showed hyperacidity. In view of the frequency of hypoacidity in normal people over 50 years of age, the findings in this test are not diagnostic; however, a decrease or an absence of free hydrochloric acid must arouse strong suspicion, and necessitates the positive exclusion of carcinoma. The possibility of cancer occurring in the presence of normal and increased acidity has been called to our attention. The high percentage of cases of hypoacidity or achlorhydria in both of our studies is perhaps indicative of the number of patients with advanced type of cancer admitted to Bellevue Hospital. In

consideration of the simplicity of this procedure, gastric analysis should be part of a routine examination of all those in the cancer age group.

X-ray Examination

X-ray examination of the stomach with contrast media was carried out in 124 of the 139 cases. One hundred twelve showed roentgenologic evidence of gastric malignancy, a diagnostic accuracy of more than 90 per cent. Of the 12 cases eventually diagnosed as carcinoma by autopsy or laparotomy: seven were reported as negative, three were diagnosed as ulcer of the stomach, one as an extragastric tumor, and one as a benign tumor of the stomach.

During the 7 years covering our present study there has been a large increase (approximately 30%) in the number of patients subjected to X-ray examination for gastric disease. An increasing percentage of cases are correctly diagnosed by fluoroscopic and X-ray examination. The roentgenologist has proved himself vastly superior to the clinician in diagnosis, and the asymptomatic patient will only come to operation subsequent to discovery of the condition by X-ray examination (9).

A comparison of the percentage of operable cases and the possibility of cure during the past 7 years (Series A) with the previous 20 years (Series B) shows a decided similarity. With the exception of the increase in resectability (2.2% to 5%), there is no statistically important change. The rate of operability remains approximately the same (33.4% to 36.7%).

Without any attempt to excuse our poor results, it must be considered that the cases studied were of consecutive admissions, and many had been diagnosed elsewhere. Thirty-nine (28%) were considered unresectable by previous laparotomy or clinical examination, prior to admission to the hospital. If this number is subtracted from our total, it raises the percentage of operability from 36.7 to approximately 50 per cent and the percentage of resectability from 13.7 to 19 per cent. Even this increase in the percentage of operable and resectable cases, as compared with the results of our previous series (Series B) should not lead to the conclusion that the status of these patients has changed. The supposed improvement is more apparent than real. It cannot be considered as due to earlier diagnosis or therapeutic advance, in view of the end-results. In our opinion any increase in operability and decrease in mortality is due to improved techniques utilized in preoperative and postoperative care (i.e., intravenous plasma, proteins, amino acids, vitamins, frequent transfusions, Wangenstein drainage, etc.). The institution of an anesthesia service at Bellevue Hospital, with trained anesthetists who visit the patients both preoperatively and postoperatively (frequently using positive pressure, paravertebral block, cyclopropane, and curare), has decreased the number of post-anesthetic and postoperative complications.

Although an increased number of patients recover from the operative procedure, this increase is not reflected in the percentage of actual cures. This fact is emphasized by a study in the Fourth Division at Bellevue Hospital of 52 patients with a previous diagnosis of carcinoma of the stomach, who were readmitted subsequently and observed during this same period (1939 to 1945).

Of these 52 patients, 42 were previously operable, exploratory only was performed on 15, palliative procedures on 2 and gastric resections were done on 25. All of these patients either died during their readmission to Bellevue

Table II.—Duration of Symptoms

| Length of Time | Inoperable | Operable | Resectable |
|-------------------|------------|----------|------------|
| Less than 1 month | 9 | 3 | ... |
| 1 to 3 months | 13 | 9 | 4 |
| 3 to 6 months | 15 | 12 | 2 |
| 6 to 12 months | 18 | 16 | 5 |
| 1 to 2 years | 5 | 2 | 2 |
| 2 to 3 years | 5 | 5 | 4 |
| 3 to 5 years | 2 | 2 | .. |
| 5 to 10 years | 2 | 1 | 1 |
| Over 10 years | 2 | 1 | 1 |
| Total | 76 | 51 | 19 |

Hospital, or they were transferred, bedridden, to a home for incurables where they succumbed. None of the patients on whom resection was not done lived longer than 10 months, and the average length of life was $6\frac{1}{2}$ months. The subsequent course of the 25 patients resected (Table IV) and later readmitted indicates that even though an increase in the percentage of resectability has taken place, the eventual outlook for what we now consider the most favorable cases is bad indeed. A life expectancy of less than 2 years following resection cannot be considered progress in the cure of gastric cancer.

Peptic Ulcers

There were 16 cases (11.5% of the total) in which the history made the possibility of malignant degeneration of a benign peptic ulcer a factor for consideration. As in the previous series, in which 17.1 per cent of the patients presented this possibility (as well as in other studies 2, 3, 8, 16, 17, 18), these cases have been carefully investigated. Seven were diagnosed as duodenal ulcers, and as such can either indicate errors in diagnosis or the concomitant

Table IV.—End-Results in 25 Patients with Gastric Resection for Cancer

Readmitted between 1939 to 1945

Length of time between operative procedure and final readmission.

| | No. Cases |
|-----------------------------|---------------------|
| Less than 3 months..... | 3 |
| Less than 1 year..... | 9 |
| Less than 2 years..... | 10 |
| More than 2 years*..... | 3 |
| Total Number of months..... | 583 |
| Average..... | $23\frac{1}{4}$ mo. |

*One case was readmitted with a period of 288 months between operation for gastric malignancy and death. Without this case the average length of time is reduced to $12\frac{1}{4}$ months.

Table III.—Gastric Analysis*

| | No. Cases |
|-----------------------------------|-----------|
| Total | 63 |
| Hypoaclidity or achylia | 55 |
| Normal acidity | 6 |
| Hyperacidity | 2 |

*Method: A Levin tube No. 18 was passed through the nose into the stomach, and a fasting specimen of about 30 c.c. collected and labeled as such; $1/3$ cc. of histamine was injected subcutaneously. A test specimen of about 10 c.c. was then taken and labeled No. 1, and after that at 15 minute intervals additional specimens, to a total of 4 were collected and labeled No. 2, No. 3, and No. 4, respectively.

existence of a duodenal ulcer and a gastric malignancy near the pylorus. Each of the 9 cases which were diagnosed as gastric ulcer has been reviewed and received exhaustive study. Since the previous report from our gastroenterological clinic (18) concerning the possibility of malignant degeneration of peptic ulcers, we have followed 165 cases of gastric ulcers over periods from 1 to 19 years, and have failed to find a single case in which the transformation from a benign ulcer to a gastric neoplasm could be proved. Extensive investigations have either shown the separate and individual inception of the lesions, or demonstrated the error in the diagnosis of a benign peptic ulcer for what was later proved to have been a malignant lesion from its onset. In several cases of carcinoma of the stomach which we have reviewed, clinical history or X-ray study caused suspicion that they had their origins in peptic ulceration.

Case 1. A 60 year old white male in whom a diagnosis of peptic ulcer had been made 17 years before had had a gastric resection at that time. The patient was admitted to this hospital in February, 1937, because of a recurrence of ulcer symptoms. A gastroscopic examination revealed two ulcerative lesions near the ostia. He was discharged following improvement under medical care. In June, 1938, he returned because of persistent epigastric pain. An exploratory operation was performed, dense adhesions were released, and the stomach was found free of disease by gross examination. Gastroscopic examination in December, 1938, revealed no signs of ulceration, but the development of atrophic gastritis. He was readmitted in 1943, and laparotomy revealed an inoperable malignant lesion of the stomach.

Case 2. A 47 year old white male, who had had a resection for gastric ulcer in April, 1939, returned because of malfunction of the stoma in March, 1940. A further gastric resection to eliminate the malfunctioning stoma was performed. Three months later he returned to the hospital because of a recurrence of gastric dysfunction; exploration revealed "extensive stony hard lesions on the stomach, liver, peritoneum, and omentum." The pathologist reported carcinoma. At this time, the microscopic sections taken from the stomach at the two previous operative procedures performed in 1937 and 1940 were re-examined by Dr. Douglas Symers, then Director of Pathology in New York City hospitals. He reported that adenocarcinoma was present in all the specimens previously removed and reported as peptic ulcers.

In both of these cases, simple clinical deduction might lead to the belief that malignant degeneration of previously benign lesions had taken place. In one case we have gastroscopic evidence that the ulcerations had healed and atrophic gastritis was present 4 years prior to the patient's admission for a malignant condition. In the second case, a careful pathological review

of the microscopic sections from the two previous operations showed that the supposedly benign peptic ulcer had always been malignant.

In 1937 a series of 109 cases of gastric ulcers and 118 cases of gastric cancers were reviewed in search of evidence for the change from benign ulcer to neoplasm (18). Together with this series, since 1919 we have followed 583 patients with carcinoma of the stomach who have been admitted to our wards, and 1,475 cases of peptic ulcer (of which 165 were gastric ulcers) which have been followed in our gastroenterological clinic over a 1 to 19 year period. In none of these cases was it possible to prove that malignancy had its inception in benign ulceration, nor have any of the known ulcers developed malignancy.

Clinical and pathological experience in surgery warns against didactic statements concerning carcinogenesis. Isolated cases in our series might leave reasonable doubt concerning the inception of the malignant condition.

Case 3. A 43 year old white male with a typical history of peptic ulcer over a 10 year period developed an additional severe pain radiating through the back. X-ray films were interpreted as showing "a large penetrating ulcer of the lesser curvature of the pars media." On resection of the stomach, the lesion was suspected of malignancy on gross examination, and the pathological examination showed adenocarcinoma of the stomach.

From this patient's history, we can conjecture that this man had a peptic ulcer of the stomach over a long period of time, supposedly verified by X-ray findings, and later a malignant condition at operation. As to whether this man had both a carcinoma and a peptic ulcer at the same time, or whether he developed a gastritis which underwent neoplastic degeneration, or whether the carcinoma originated at or near the peptic ulcer, we do not know. Several eminent authors (4, 7, 14, 21, 27, 29) on this subject consider that the change from peptic ulcer to malignant lesion occurs frequently. Although it is possible that a neoplasm may arise at the site of the peptic ulcer, in our experience this transformation is not only unusual, but extremely uncommon. Whether a gastric carcinoma is early or late, small or large, it may undergo peptic ulceration, eroding away all signs of malignancy (12), and at this time will give the signs and symptoms of this condition. By X-ray examination it may even be mistaken for benign peptic ulcer, and the malignancy may not be apparent until later. In spite of the fact that we perform gastric resections on many patients, including those with intractable gastric ulceration, as well as in any case in which there is doubt concerning the diagnosis of carcinoma, we do not believe that the potentiality of malignancy originating in a benign peptic ulcer is an indication for operation.

Gastrosocopy

Gastrosocopic examination was attempted in 28 cases. In 22 the diagnosis of carcinoma of the stomach was correctly made. One case was termed "negative," and one case diagnosed as gastric ulcer; 4 attempts to perform gastrosocopic examination were considered "incomplete" or "unsuccessful" and no report rendered.

The flexible gastroscope allows visualization of the gastric mucosa and is an additional means of verifying the diagnosis of gastric cancer. The interpretation of the results of gastrosocopic examination (like the results of any

other diagnostic procedure) must be tempered with the knowledge that there is an element of error in the procedure, and also that the accuracy of the observations are dependent on the position of the lesion and the experience of the gastroscopist. However, since any information concerning the condition of the gastric mucosa is of diagnostic importance, gastroscopic examination should be utilized in all lesions of a questionable or controversial nature following X-ray and laboratory studies.

The extensive use of this instrument by experienced observers has verified the findings of Faber and Konjetzny concerning the actuality of involutory or retrogressive gastritis. Chronic gastritis frequently accompanies gastric ulcers. To clarify a term, gastritis does not necessarily mean an inflammatory lesion, but includes functional and pathological derangements of the glandular elements which make up the involutory changes. As shown by Judd, definite changes in the mucosa indicative of severe chronic gastritis of long standing are present in association with gastric carcinoma. The origin of gastric cancer on a mucosa which is the seat of this pathological change has been described so frequently (5, 11, 12, 15, 22, 25, 26) during the past 20 years that we believe that this change must be considered an important factor in the vast majority of cases.

Rigler has recently reported on the frequent occurrence (more than 8%) of carcinoma on the atrophic gastric mucosa of patients suffering from pernicious anemia. The age and sex incidence of chronic retrogressive gastritis coincides with the age and sex of the patients in both series of gastric carcinoma which we have reported (1, 3). From our observations it would seem that the instigation of gastric carcinoma is much more closely related to the chronic pathological involutory changes, which take place in the gastric mucosa than it is to benign peptic ulceration.

In reports on the endocrine nature of the gastric mucosa (1, 3) we have called attention to massing of cases in the 40 to 70 year old group, and the occurrence of cancer in 3.4 males for each female. Our findings in this review are practically identical with our previous studies. Although we realize that carcinoma of the stomach occasionally appears in younger people, the great majority of these cases occurs after 40, and the problem of gastric carcinoma lies within this large group.

The preponderance of males and the high incidence in later life in all studies emphasize the endocrine factor in the etiology of gastric neoplasms. During that period in life when gastric carcinoma most frequently occurs there are marked changes of the content and nature of the sex hormones. Experimental work has shown (1, 3) that activity of the gastric mucosa is influenced by hormones, including changes in the androgen-estrogen ratio. Although it is our belief, based on the experimental results and clinical observations of ourselves and others (reviewed in previous publications 1, 3), that the relationship between the hormone control of the gastric mucosa and gastric disease is an important carcinogenic factor, we fully realize that it will take further extensive experimental study to prove the various etiological agents responsible for the change from normal or pathological gastric mucosa to neoplasm.

Discussion

From our findings it is evident that the outlook for the patient with gastric carcinoma continues to be dismal. Any gains that have been made

are the result of improved preoperative and postoperative care. Parenteral administration of fluids to control biochemical changes, advances in anesthesia, and the advent of sulfonamides and penicillin have raised the rates of operability and resectability, and lowered the operative mortality, but have not appreciably affected the course of the disease. Comparative studies of the results from more specialized surgical clinics have shown that operability, resectability, and the length of postoperative cure are greatly influenced by the selection of cases (24). But the prognosis of the patients in a large general hospital (which represents a cross-cut of the general population) remains distressingly unfavorable. The lack of time relationship between the onset of symptoms (as we now understand it) and the percentage of resectability reveals that our furthest progress has been our determined effort to diagnose late cases. The problem resolves itself to evolving a means of bringing patients with carcinoma of the stomach to operation early in their pathological course (6, 9, 12), rather than early in their clinical course. At present we operate on a curable carcinoma of the stomach by accident, or because of an extremely fortuitous early diagnosis.

Since our attempts to discover early gastric carcinoma are obviously failures, our efforts should be directed toward the improvement of our methods of diagnosis. At the present time, our only method of revealing asymptomatic curable gastric cancer is by fluoroscopic and X-ray studies. The institution of these studies on a mass scale, by methods similar to those used in mass examinations for tuberculosis, offers a great opportunity to uncover asymptomatic malignant disease. The use of such a procedure has been advocated by several since 1935 (6, 28).

Comparative mass fluoroscopic and X-ray studies on approximately 400 American soldiers and 400 German prisoners with gastro-intestinal complaints showed that 1 per cent of the German prisoners had carcinoma of the stomach, while none was found in a similar group of American soldiers (30).¹ Although the study of Dailey and Miller on 500 normal people did not reveal any gastric carcinoma, we believe that it must be carried out in groups larger than 1,000 to be statistically valuable, and that routine annual fluoroscopic and X-ray studies of the stomach, especially in the carcinoma age group, should be instituted.

A recent authoritative mass fluoroscopic and X-ray study (28) on a consecutive group of 2,413 patients without gastrointestinal complaints revealed that 3 had asymptomatic gastric cancer. This procedure, conducted on a larger scale, would undoubtedly disclose and bring to operation a higher percentage of resectable and curable patients than any other means at our disposal. The outline of a plan by which mass fluoroscopic and X-ray studies of the stomach could be routinely carried out on an increasing number in the carcinoma age group is proposed.

1. Education of the public (a) on the asymptomatic character of carcinoma of the stomach; (b) on the necessity for routine fluoroscopic and X-ray examination of the stomach.

2. Fluoroscopic and X-ray studies of the stomach performed (a) as part of an annual physical examination in military services; (b) as part of an annual physical examination in veterans' organizations; (c) as part of an

1. It is interesting to note that the average age group of the German prisoners was 34 while among the American soldiers it was 28.

annual physical examination in large industries; (d) as part of an annual physical examination on members of labor unions; (e) as part of a physical examination prior to the issuance of health and life insurance policies; (f) as a routine procedure on all patients over 40 years of age entering hospitals.

3. Availability to private physicians of facilities for fluoroscopic and X-ray studies of the stomach for those on every economic level, so that all patients over 40 years of age are given routine annual examination.

4. Gastric analysis and gastroscopy, as well as further repeated X-ray studies in all questionable or controversial lesions found on fluoroscopic examination.

In our present state of ignorance concerning carcinogenesis in general, and the early diagnosis of gastric carcinoma in particular, the popularization of fluoroscopic and X-ray examinations of the stomach presents an important method of discovering an increasing number of curable cases among the general population.

Conclusions

1. Comparative studies of 583 cases of carcinoma of the stomach between 1918 and 1945 demonstrate the poor prognosis and emphasize lack of progress.

2. The absence of relationship between the onset of the symptomatology, operability, and possibility of cure reveals our failure in the diagnosis of early cases.

3. Investigation does not substantiate the possibility of the transformation of benign ulcer to gastric carcinoma as anything but a rare occurrence.

4. It is suggested that the following four factors have a definite relationship: (a) age and sex incidence; (b) chronic "gastritis"; (c) endocrine effects on the gastric mucosa; (d) the inception of gastric neoplasm.

5. A plan is presented for the utilization of mass fluoroscopic and X-ray studies of the stomach, as a means of discovering curable malignant conditions.

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Discussion

5-10% of granular cell tumors occur before adolescence, giving rise to precocious menstruation with early sexual and somatic development. 30% occur during the period of sexual maturity giving rise to amenorrhoea, oligomenorrhoea followed by profuse menses. 60% occur in the post-menopausal age. It is the latter group that I will briefly discuss.

Amenorrhoea of long or short duration followed by occurrence of vaginal bleeding (pseudo-menstrual in type) is the rule. Physical findings usually reveal an enlarged uterus with a palpable adnexal tumor. Pathologically

Granulosa Cell Tumor

C. TUPPER, M.D.

Victoria General Hospital, Halifax, N. S.

IN view of the interest in this type of ovarian tumor shown by recent articles I wish to present the following case. According to Ewing, the average tumor is solid or riddled with small cysts and only rarely does it appear as an ordinary cystoma with solid tissue in its wall. The tumor to be presented is of this rare type.

Case History

A married white multipara aged 62 was admitted to the Victoria General Hospital on March 4, 1947, complaining of bleeding per vaginam. With the exception of rheumatoid arthritis for several years, her personal and family history were essentially negative. Menses had begun at 14 years and had been normal with menopause occurring at 50 years of age with no unusual symptoms. There had been no bleeding until February, 1946, when she had had what appeared to be a regular period of eight days. This recurred every 28-30 days during February, March, April and May, at which time she noted some enlargement of breasts. This bleeding was painless and no clots were passed. In May, 1946, a dilatation and curettage was performed. The pathological report revealed an endometrial hyperplasia of "Swiss Cheese Character." From this time on, she was symptom free until February, 1947, when she began to flow again, and this continued up to three days before admission. Bleeding was moderate, requiring the wearing of a pad.

Positive physical findings were the presence of arthritic changes in joints of hands and feet; presence of fine rhonchi in both lung fields and some breast hypertrophy reflecting action of estrin. B. P. 190/104. Haematological examination and urinalysis were essentially negative.

At operation, April 5, 1947, a large grapefruit-sized cyst of the left ovary was found. The wall of the cyst was comparatively thick, nodular in places, and contained a yellowish granular substance. The right tube and ovary showed no pathological change. The uterus showed an endometrial hyperplasia of the type found in hyperestrogenism.

Microscopically—the wall of the cyst was composed of large granulosa like cells arranged with an architecture of mixed folliculoid and cylindroid types so characteristic of granulosa cell tumor.

The patient was discharged 11 days after operation to receive deep therapy as an outpatient.

Discussion

5-10% of granulosa cell tumors occur before adolescence, giving rise to precocious menstruation with early sexual and somatic development. 30% occur during the period of sexual maturity giving rise to amenorrhoea alone or amenorrhoea followed by profuse menses. 60% occur in the post-menopausal age. It is the latter group that I will briefly discuss.

Amenorrhoea of long or short duration followed by recurrence of vaginal bleeding (pseudo-menstrual in type) is the rule. Physical findings usually reveal an enlarged uterus with a palpable adnexal tumor. Endometrial

hyperplasia of the Swiss Cheese Pattern is the common pathological evidence of excessive estrogenic effect. If this type of endometrial scrapping is found in a woman past the menopause, granulosa cell tumor should be suspected as the cause. Breast changes indicated by Mammary Hypertrophy is another indication of estrogenic excess.

Recent work has indicated that conservative surgery in this post-menopausal age group has resulted in recurrences in several instances. Consequently, the treatment of choice is total hysterectomy plus bilateral Salpingo-oophorectomy.

The degree of malignancy is still debatable although most authorities consider it as being low. However, "Block and Bachman" quote three cases with recurrent granulosa cell tumors. 15-16-19 years respectively after the original operation in spite of the fact the tumors were well encapsulated and showed no evidence of metastases or implantation.

Until more is known regarding the malignant potentialities of this group of tumors and the effects of irradiation, it is suggested by most authorities that post operative irradiation is indicated.

Suggested references on this tumor:

- Ovarian Tumors—Bachman and Block—Progress of Med. Science, Dec., 1946.
 Granulosa Cell Tumor—Doherty—Am. J. of Obs. & Gyn., March, 1939.
 Granulosa Cell Neoplasm with Discussion of Possible Histogenic—Am. J. of Obs. & Gyn., Oct., 1939.
 Granulosa Cell Tumor of Ovary with Observations on Radiosensitivity—Am. J. of Obs. & Gyn., 1940.
 Ovarian Neoplasms—Doherty—Surg. Gyn. & Obs., Sept., 1939.

The Seventy-Eighth Annual Meeting of The Canadian Medical Association

The seventy-eighth annual meeting of the Canadian Medical Association was held at the Royal Alexandra Hotel at Winnipeg from June 23rd through June 27th. In every way it was a most successful gathering. There were over one thousand physicians in attendance. The scientific programme was well chosen and well carried out, and the social side and hospitality were everything one could desire.

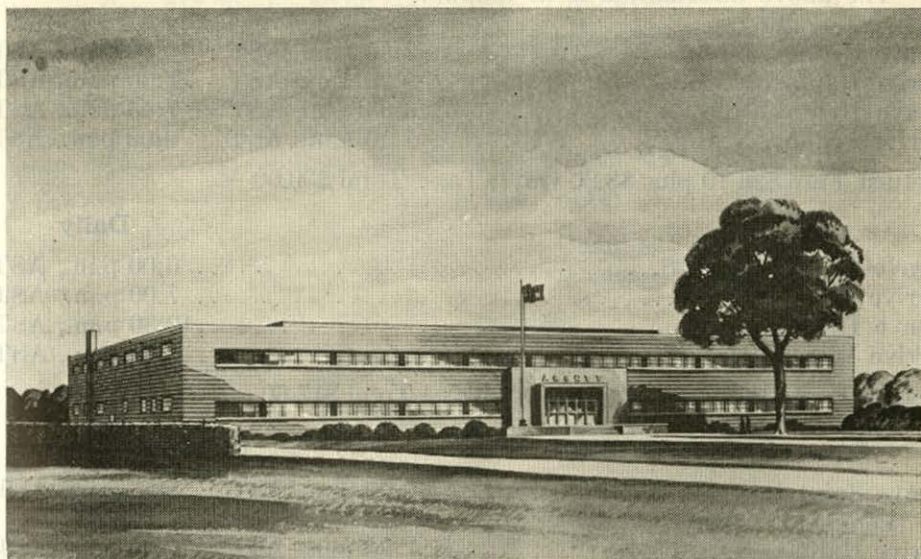
The first two days were given over to the deliberations of Council, which meant the consideration and adoption or otherwise of the many reports. Of all the subjects discussed the matter of medical economics and in particular prepayment plans of medical care commanded the most attention. The Association decided to create a central advisory committee on prepayment medical care for the benefit of the respective divisions. The advice and experience of the central committee will be available to any of the branch divisions on request. And incidentally, although it has nothing to do with the meeting of Council there was a special meeting of the Maritime representatives dealing with the question of prepayment medical care. It was decided at the informal meeting that each Maritime Division should make a special study of prepayment plans already in existence in Canada and the United States and that later on representatives from the three societies should meet to discuss the feasibility of starting a prepayment plan for the Maritimes under the joint control of the three Medical Societies.

The sectional meetings represented all branches of medicine. They were well attended, the papers and discussions most interesting and stimulating. The general sessions which were held daily, were excellent with outstanding contributions from Canada, the United States and England. To mention a few of them, Professor J. M. McMichael, Professor of Medicine of the Post-Graduate School at Hammersmith spoke on "The Textbook and Education in Medicine." He expressed the opinion that medical education was not keeping pace with the modern practice of medicine. That certain subjects, e.g., anatomy, was receiving too much time in the curriculum in proportion to its value to-day in relation to other subjects which have become more important in the last few years. He suggested more time given to the social side of medicine. Doctor Paul O'Leary of Rochester presented a paper on "The Present Status of Penicillin in the Treatment of Syphilis." It was a clear, excellently prepared address giving his experience and quoting that of others on this subject. Doctor C. B. Farrar of Toronto also made a valuable contribution. He presented a paper "Psychotherapy in Medical Practice." beginning with a simple definition of Psychiatry he carried on by showing the application of psychological principles to all branches of medicine. It was a practical paper pointing out the need for and appreciation of the value of considering the psychological factors in practice.

The social side of the meeting was delightful. President G. F. McGuinness and Mrs. McGuinness gave a reception to members of Council. The

Manitoba Division entertained members of Council at dinner followed by a most interesting and amusing floor show. The Annual General Meeting was held with all pomp and ceremony and the candidates from different places presented for honours. There followed a reception by the President, Past President, Hon. R. F. McWilliams, K.C., Lieutenant-Governor of Manitoba and their ladies. Even the luncheons were well arranged and the speeches were good and were not too long. All in all it was a most successful meeting and congratulations are due to the parent society, and in particular to the Manitoba Division for such a delightful gathering.

H. G. G.



The new Montreal plant of Abbott Laboratories Limited has just been opened and is now in full operation. The very latest laboratory and manufacturing equipment for the production of pharmaceuticals has been installed. Outstanding features of the building are an attractive modern cafeteria and rest room for staff and spacious, modern offices equipped with the latest lighting, air conditioning and soundproofing devices. No money has been spared to make this plant one of the finest on the North American Continent.

Correspondence

TRANS-CANADA AIR LINES

Dr. H. G. Grant
Dean of Medicine
Dalhousie University
Halifax, N. S.

Nova Scotian Hotel
Halifax, N. S.
July 10, 1947

Dear Dr. Grant:

It is regretted you were out of town when I called to-day, but your secretary, Mrs. M. G. Currie, provided me with the necessary information and kindly offered to bulletin our service and fares in your next MEDICAL BULLETIN for the information of your members attending The Medical Society of Nova Scotia Convention here in Halifax, N. S., October 6-10, 1947.

The above information is as follows:

| | Daily | |
|--|----------------|-----------------|
| Leave Sydney, N. S..... | 7:50 a.m., AST | 10:00 p.m., AST |
| Arrive Halifax, N. S..... | 9:20 a.m., AST | 11:30 p.m., AST |
| Leave Halifax, N. S..... | 6:05 a.m., AST | 7:45 p.m., AST |
| Arrive Sydney, N. S..... | 7:20 a.m., AST | 9:00 p.m., AST |
| Return Fare \$26.10 plus \$3.90 Govt. Tax—Total \$30.00— | | |

| | Daily | |
|--|-------|-----------------|
| Leave Yarmouth, N. S..... | | 6:00 p.m., AST |
| Arrive Halifax, N. S..... | | 7:00 p.m., AST |
| Leave Halifax, N. S..... | | 12:30 p.m., AST |
| Arrive Yarmouth, N. S..... | | 1:40 p.m., AST |
| Return Fare \$15.30 plus \$2.30 Govt. Tax—Total \$17.60— | | |

| Direct Line | Daily | |
|--|----------------|----------------|
| Leave Saint John, N. B..... (Pennfield Airport) | 6:20 p.m., AST | 4:55 p.m., AST |
| Arrive Halifax, N. S..... | 7:30 p.m., AST | 7:00 p.m., AST |

| Direct Line | Daily | |
|--|----------------|-----------------|
| Leave Halifax, N. S..... | 6:00 p.m., AST | 9:35 a.m., AST |
| Arrive Saint John, N. B..... (Pennfield Airport) | 7:20 p.m., AST | 10:55 a.m., AST |
| Return Fare \$20.70 plus \$3.10 Govt. Tax—Total \$23.80— | | |

| Via Yarmouth | Daily | |
|--|-------|----------------|
| Leave Saint John, N. B..... (Pennfield Airport) | | 8:30 p.m., AST |
| Arrive Halifax, N. S..... | | 9:40 p.m., AST |

Via Yarmouth

Daily

Leave Halifax, N. S. 12:30 p.m., AST
 Arrive Saint John, N. B. 2:40 p.m., AST
 (Pennfield Airport)

Return Fare \$26.10 plus \$3.90 Govt. Tax—Total \$30.00—

Daily

| | | |
|--|-----------------|-----------------|
| Leave Moncton, N. B. 4:55 a.m., AST | 11:20 a.m., AST | 4:35 p.m., AST |
| Arrive Halifax, N. S. 5:50 a.m., AST | 12:15 p.m., AST | 5:30 p.m., AST |
| Leave Halifax, N. S. 9:40 a.m., AST | 8:00 p.m., AST | 11:45 p.m., AST |
| Arrive Moncton, N. B. 10:40 a.m., AST | 9:00 p.m., AST | 12:45 a.m., AST |

Return Fare \$13.95 plus \$2.10 Govt. Tax—Total \$16.05—

Daily Except Sunday

| | | |
|--|----------------|-------------------|
| Leave Charlottetown, P. E. I. | 2:15 p.m., AST | (Maritime Central |
| Arrive Halifax, N. S. | 3:15 p.m., AST | Airways) |
| Leave Halifax, N. S. | 4:30 p.m., AST | (Maritime Central |
| Arrive Charlottetown, P. E. I. | 5:25 p.m., AST | Airways) |

Return Fare \$17.30 plus \$2.60 Govt. Tax—Total \$19.90—

Reservations should be made as far in advance as possible through any T. C. A. office.

I trust this information will be of interest to your members and would like to take this opportunity of wishing your convention every success. Your co-operation in reproducing the above is deeply appreciated.

Yours very truly,

J. C. Campbell
 District Traffic Manager

Society Meetings

Western Nova Scotia Medical Society

At the annual meeting of the Western Nova Scotia Medical Society held Wednesday, June 25th, at Braemar Lodge, the following officers were elected or the coming year:

President—Dr. P. E. Belliveau of Meteghan;

Vice-Presidents—Dr. R. M. Zwicker of Lockeport, Dr. B. d'Eon of Weymouth and Dr. D. R. Sutherland of Yarmouth;

Secretary-Treasurer—Dr. D. F. Macdonald of Yarmouth.

Representatives to the Executive of The Medical Society of Nova Scotia—Dr. H. J. Pothier of Weymouth and Dr. D. F. Macdonald of Yarmouth.

A very pleasant and instructive meeting was held. After the usual preliminaries a fine dinner was served in the main dining room of the Lodge following which the gathering adjourned to the Lake Lodge where two interesting papers, one by Dr. W. G. Colwell on "Difficulties in Labor" and the other by Dr. K. M. Grant on "Sterility," were enjoyed. Approximately twenty physicians, from Lockeport to Weymouth attended. After the papers an excellent film on the Delivery of Quadruplets was presented.

The Combined Meeting

of the

DALHOUSIE MEDICAL SCHOOL REFRESHER COURSE

and

THE MEDICAL SOCIETY OF NOVA SCOTIA

will be held at the

Nova Scotian Hotel, Halifax, N. S.

October 6th to 10th, inclusive.

The Refresher Course will run from Monday, October 6th through Friday, October 10th. Clinics will be held each morning and lectures in the afternoons. The visiting speakers will be Doctor Harrison L. McLaughlin, Assistant Professor of Clinical Orthopaedic Surgery, College of Physicians and Surgeons of Columbia University, Doctor Edwin M. Robertson, Professor of Obstetrics and Gynaecology at Queen's University Kingston and Doctor G. R. Brow, Professor of Clinical Medicine, McGill University of Montreal, the two latter coming to us through the courtesy of the Canadian Medical Association. The newly elected President of the Canadian Medical Association, Doctor F. G. McGuinness, and also the Assistant Secretary of the Canadian Medical Association, Doctor A. D. Kelly will be with us for the meeting of the Executive on Tuesday afternoon, for the general session on Tuesday evening, and also we trust they will be able to attend our dinner on Wednesday. Doctor T. C. Routley, the General Secretary, plans to be in England at that time, but if he returns in time for our meeting we will have the pleasure of his company.

The Executive meeting of The Medical Society of Nova Scotia will be held on Tuesday afternoon at 2.30 at the Nova Scotian, the first general business session of The Medical Society of Nova Scotia will be held Tuesday evening at the Nova Scotian at eight o'clock in the ball-room, the second general business session will be held on Thursday at five-thirty immediately following the last lecture, at the Nova Scotian Hotel.

Although it is now quite early, hotel accommodations in Halifax are still difficult to secure, and we would advise those who plan to attend to make reservations with the hotel immediately.

Dalhousie Medical Faculty; Programme Refresher Course October 6th to 10th Inclusive

| Monday, October 6 | Tuesday, October 7 | Wednesday, October 8 | Thursday, October 9 | Friday, October 10 |
|--|---|---|--|---|
| <p>VICTORIA GENERAL HOSPITAL</p> <p>9.30 a.m.-12.30 p.m.</p> <p>Symposium on non-tuberculous diseases of chest</p> <p>Drs. V. O. Mader</p> <p>V. D. Schaffner</p> <p>T. M. Sieniewicz</p> <p>C. J. W. Beckwith</p> <p>D. M. MacRae</p> | <p>VICTORIA GENERAL HOSPITAL</p> <p>9.00 a.m.-10.00 a.m.</p> <p>Surgical Clinic</p> <p>Drs. Curry and Ross</p> <p>10.10 a.m.-11.10 a.m.</p> <p>Treatment and care of congestive heart failure</p> <p>Dr. G. R. Brow</p> <p>11.20 a.m.-12.20 p.m.</p> <p>The Gynaecological Examination</p> <p>Dr. E. M. Robertson</p> | <p>CAMP HILL HOSPITAL</p> <p>9.00 a.m.-9.40 a.m.</p> <p>Surgical Clinic</p> <p>Dr. J. A. Noble</p> <p>9.50 a.m.-10.20 a.m.</p> <p>Urological Clinic</p> <p>Dr. C. L. Gosse</p> <p>10.30 a.m.-11.00 a.m.</p> <p>Neurological Clinic</p> <p>Dr. W. Leslie</p> <p>11.10 a.m.-11.40 a.m.</p> <p>E.E.N.T. Clinic</p> <p>Drs. R. H. Stoddard and L. G. Holland</p> <p>11.50 a.m.-12.20 p.m.</p> <p>Biochemical Clinic</p> <p>Dr. C. M. Harlow</p> | <p>VICTORIA GENERAL HOSPITAL</p> <p>9.00 a.m.-10.00 a.m.</p> <p>Orthopaedic Clinic</p> <p>Dr. H. I. McLaughlin</p> <p>10.10 a.m.-11.10 a.m.</p> <p>Endocrinopathy in Gynaecology</p> <p>Dr. E. M. Robertson</p> <p>11.20 a.m.-12.20 p.m.</p> <p>The Recognition, Diagnosis and treatment of acute coronary occlusion</p> <p>Dr. G. R. Brow</p> | <p>VICTORIA GENERAL HOSPITAL</p> <p>9.00 a.m.-10.00 a.m.</p> <p>Orthopaedic Clinic</p> <p>Dr. H. I. McLaughlin</p> <p>10.00 a.m.-11.10 a.m.</p> <p>Paediatric Clinic</p> <p>Dr. G. B. Wiswell</p> <p>11.20 a.m.-12.20 p.m.</p> <p>Surgical Clinic</p> <p>Drs. N. H. Gosse and H. D. O'Brien</p> |

NOVA SCOTIAN HOTEL

2.30 p.m.-3.20 p.m.

The Diagnosis and treatment of meningitis

Dr. C. W. Holland

3.30 p.m.-4.20 p.m.

Modern trends in the control of syphilis

Dr. B. D. B. Layton

4.30 p.m.-5.20 p.m.

Anterior Poliomyelitis

Drs. C. E. Kinley and
C. B. Stewart**NOVA SCOTIAN HOTEL**

2.30 p.m.-3.20 p.m.

Subacute bacterial endocarditis

Dr. G. R. Brow

3.30 p.m.-4.20 p.m.

Occipito-Posterior: Diagnosis and treatment

Dr. E. M. Robertson

4.30 p.m.-5.20 p.m.

Points in the diagnosis and management of common accessible cancer

Dr. Ivan H. Smith

NOVA SCOTIAN HOTEL

1.00 p.m.

The Medical Society of Nova Scotia Luncheon

3.00 p.m.

Official Opening of New Victoria General Hospital

7.00 p.m.

Annual Dinner, The Medical Society of Nova Scotia at Nova Scotian Hotel

NOVA SCOTIAN HOTEL

2.30 p.m.-3.20 p.m.

Urinary disorders in the female

Dr. E. M. Robertson

3.30 p.m.-4.20 p.m.

An evaluation of the systolic murmur

Dr. G. R. Brow

4.30 p.m.-5.20 p.m.

Knee joint injuries

Dr. H. I. McLaughlin

NOVA SCOTIAN HOTEL

2.30 p.m.-3.20 p.m.

Shoulder joint injuries

Dr. H. I. McLaughlin

3.30 p.m.-4.20 p.m.

Practical consideration of the use of some new drugs

Dr. M. G. Whillans

4.30 p.m.-5.20 p.m.

Essentials of sanitation of milk

Mr. R. D. McKay

Personal Interest Notes

THE marriage took place at Halifax on July 21st of Doctor Donald Stuart Shaw Lindsay, only son of Doctor and Mrs. Roy D. Lindsay, and Miss Anna Jean MacLaren Phinney, elder daughter of Mr. and Mrs. H. Maxwell Phinney, all of Halifax. Doctor Lindsay graduated from the Dalhousie Medical School in May of this year, and has been appointed to the medical staff of the Nova Scotia Hospital at Dartmouth.

Doctor Kenneth A. MacKenzie of Halifax was appointed a member of the Council of the Canadian Heart Association at the meeting in Winnipeg on June 24th.

Dr. and Mrs. G. A. Barss of Rose Bay, Lunenburg County, recently returned from an extended visit to the British West Indies. They sailed from Halifax early in February and have had a most delightful trip.

The marriage took place at Bridgewater on June 17th of Miss Helen Naugbler and Doctor James Robert Feindel, son of Mayor and Mrs. R. R. Feindel, all of Bridgewater. Doctor Feindel graduated from the Dalhousie Medical School on January 5, 1943, and is now practising at Clark's Harbour.

Doctor A. F. Miller, Medical Superintendent of the Nova Scotia Sanatorium at Kentville returned on June 12th from Atlantic City where he attended the 13th annual meeting of chest physicians. Doctor Miller has been governor of the American College of Chest Physicians in the Maritimes for a number of years. Membership of the society is close to five hundred medical men from all parts of the world. Highlights of the meetings were discussion on the following topics: (1) Tuberculosis control in the United States. (2) Bronchoscopy in clinical medicine and surgery. (3) Thoracoplasty in the treatment of tuberculosis. (4) Streptomycin in the treatment of human tuberculosis. On his return trip Doctor Miller stopped off in New York to discuss problems in the control of tuberculosis with the director of the tuberculosis and health association in that city.

Doctor Joseph A. MacDougall, who graduated from the Dalhousie Medical School on January 5, 1943, and who served two years in the Canadian Army Medical Corps, has been appointed full time anaesthetist at St. Martha's Hospital in Antigonish, and in addition will be medical superintendent of the hospital. Doctor MacDougall practised in Arichat following his discharge from the Army, and then took a special course in anaesthetics in Montreal. He will start his new duties about the middle of August.

Doctor E. A. Brasnet, who spent the past four months at Harvard Medical College, Cambridge, has returned to Antigonish to resume his practice. At Harvard he took a course in treatment of heart ailments, a highly specialized course to which only twelve students were admitted.

Doctor Maurice Hubar, (Dal. 1945), who was stationed in Halifax during the war years, with the Royal Canadian Army Medical Corps, left Halifax recently accompanied by his wife, for the Canadian West where they reside.

The marriage took place in Saint John on June 21st of Doctor Donne Watson Smith, son of Mr. and Mrs. Cullen B. Smith of Shubenacadie, and Miss Mary Aileen Somerville, daughter of Mr. and Mrs. Malcolm M. Somerville of Saint John. Doctor Smith graduated from the Dalhousie Medical School in May of this year, and will practise in Shubenacadie.

The BULLETIN extends congratulations to Dr. and Mrs. E. L. Ramsay (Ann Jenkins) of Clark's Harbour on the birth of a son, John Leigh, on May 3rd; to Doctor and Mrs. J. S. Miller, of Pugwash on the birth of a daughter on June 19th; to Doctor and Mrs. J. B. Crowe of New Germany on the birth of a daughter on June 27th; to Doctor and Mrs. I. M. Murray (Betty Bird) of Halifax on the birth of a son on July 1st; to Doctor and Mrs. J. W. Merritt (Mary Bell) of Halifax on the birth of a son, John Douglas, on July 3rd; to Doctor and Mrs. R. J. F. Murphy (Antoinette Dumaresq) of Halifax on the birth of a son on July 8th; to Doctor and Mrs. A. S. MacIntosh (Aileen Winter, Southsea, England) of Montreal on the birth of a son on July 12th; and to Doctor and Mrs. B. R. Wilson of Halifax on the birth of twin daughters on July 14th.

A total of 272 candidates were successful in examinations held last month by the Medical Council of Canada, Doctor J. F. Argue, Registrar, announced recently. The examinations were held in Halifax, Montreal, Toronto, Kingston and London in Ontario, and Vancouver.

Successful candidates included:

At Halifax

From Nova Scotia: James Stewart Campbell and Alexander Wilson Souter of Halifax; David McDougall Archibald, Glace Bay; Ainsley Scott Atkins, New Glasgow; Graham Fraser Colquhoun, North Sydney; Arthur Drysdale Johnson, Great Village; Donald Stuart Lindsay, Windsor Junction; Douglas Haig MacKenzie, Sydney Mines; Joseph Aloysius Roach, and Charles Patrick Miller, New Waterford; Garfield MacLeod Moffatt and George Graham Sheppard, Sydney; Railton Gaskin Ritchie, Westville; Kenneth Clark Rodger, Amherst; George McKenna Saunders, Stellarton; Maximillian Schapira, Indian Point; Donne Watson Smith, Shubenacadie; Arthur Winston Titus, Yarmouth; James Avery Vaughan, Windsor.

From New Brunswick: Raymond George Giberson, Holmesville; Barabra Josephine Robinson, Marysville; Robert Edwin Washburn, West Saint John.

From Newfoundland: Gerald Amphthil Dawe, St. John's; Edwin Benedict Redmond and Peter Godfrey Loder, Corner Brook.

Obituary

THE BULLETIN extends sympathy to Doctor E. Pearl Hopgood of Dartmouth on the death of her mother, Mrs. Hume Hopgood which occurred the end of June; to Doctor Edward DuVernet of Digby on the death of his sister, Miss Eliza DuVernet on June 25th, and to Doctor H. L. Knodell of Port Hawkesbury on the death of his mother, Mrs. Mary Ann Knodell on July 9th.

Newfoundlanders to Launch Floating X-ray Unit

Considerable interest will surround the launching of Newfoundland's first floating X-ray unit next July, if the boat being built to house the new equipment is completed by that time. The Newfoundland Tuberculosis Association has taken as its next objective the raising of funds to build a boat, buy X-ray equipment and pay the salaries of staff and crew. It is the hope of the Association that the floating unit will make it possible to check large sections of the population in remote regions of the island. The boat, when completed, is to be called *The Christmas Seal*.

Vitamin Advertising and the Mead Johnson Policy

The present spectacle of vitamin advertising running riot in newspapers and magazines and via radio emphasizes the importance of the physician as a controlling agent in the use of vitamin products.

Mead Johnson & Company feel that vitamin therapy, like infant feeding, should be in the hands of the medical profession, and consequently refrain from exploiting vitamins to the public.

IMPORTANT

Effective as of May 12, 1947, physicians are permitted six months in which to present accounts to the Workmen's Compensation Board of Nova Scotia after the last attendance given in a particular case.