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THE NOVA SCOTIA MEDICAL BULLETIN

Orthopaedic Explosion Hits Halifax

Over 400 orthopaedic surgeons from Canada, the United Kingdom, United States, New Zealand, Australia, South Africa, France and Belgium participated in a scientific meeting in Halifax on June 7-11, 1981. Together with their spouses, they enjoyed one of the most remarkable festivals of good will that has been held in this city which has become host to so many different academic and business societies. Organized by a local committee chaired by Dr. Reginald Yabsley, Chief of Orthopaedics, Victoria General Hospital, Halifax, the social and scientific arrangements worked smoothly and delegates from the Canadian Orthopaedic Association and the Canadian Orthopaedic Research Society were entertained with a ceremonial parade on Citadel Hill, a banquet in traditional dress of the last century, as well as a welcome by the ex-Mayor Edmund Morris, now Minister of Fisheries for Nova Scotia.

Presidents of the British, New Zealand, Australian and South African Orthopaedic Societies were jointed by guest speaker Dr. Paul Ficat from France and Dr. Paul Curtis, Editor of *The Journal of Bone and Joint Surgery*. In addition, Sir George Bedbrook, authority on spinal injuries, Perth, Australia; Dr. Dean MacEwen, President of the American Orthopedic Association; Dr. Rober Wells, Vice President of the American Academy of Orthopedic Surgeons, attended in one of the most unusual collections of orthopaedic expertise that has gathered together in Canada.

The Canadian Orthopaedic Association has always had the tradition of gathering knowledge, organizing exchange of information and discussion of ideas. Travelling fellows from France, Canada, United States and the United Kingdom and many orthopaedic residents ensured that the spark of youthful enthusiasm flowed through the entire proceedings to blend with the more sombre attitude of experience and sceptisism.

It is 15 years since the last Canadian Orthopaedic Association meeting was held in Halifax. That meeting was held at the Lord Nelson Hotel and comprised about 100 members. Since that time there has been a vast proliferation of knowledge and technique as well as a tremendous increase in the number of practitioners in orthopaedics.

The Canadian Orthopaedic Research Society is a vigorous group of orthopaedic surgeons and scientists carrying out an energetic program with investigation in this field. Research in basic science has led to a much better understanding of many of the fundamental aspects which form the embryological, biomechanical and biochemical basis of orthopaedics and, together with the clinical trials and observations, great advances have been made in applied Orthopaedics during the past two decades.

Congenital dislocation of the hip is no longer a disease of childhood. It is treated at birth, fractures are treated by specialists trained in special techniques, joint replacement has relieved millions of their misery of agonizing arthritis. Scoliosis is recognized in school children or corrected by surgery and bracing.

Many problems remain to be solved and one of the remarkable aspects of orthopaedics is the 25 year cycle which ideas are enthusiastically entertained and subsequently dropped.

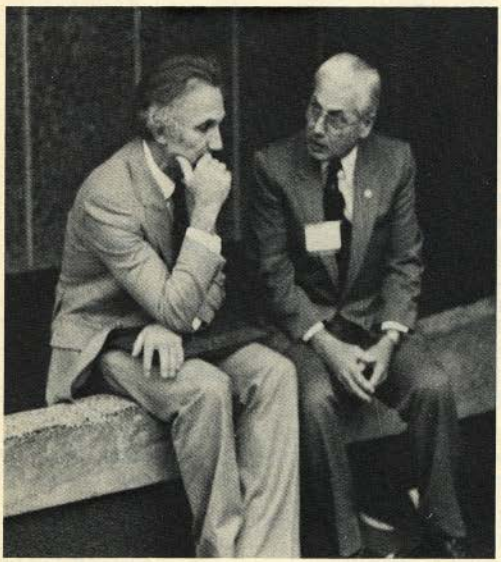
This scientific conference covered almost every aspect of modern day orthopaedics and it is hoped that the highlights depicted in this issue will reflect a true picture of the current attitudes and stimulate all those interested in the diseases of the locomotor system to even greater endeavour. □

B.J.S.G.

Personalities at the Orthopaedic Conference

Mr. Edmund Morris, Minister of Fisheries and Intergovernment Affairs, Province of Nova Scotia making presentation to the Canadian Orthopaedic Association. Left to right Dr. R. Jabsley, Dr. P. Brown, Mrs. Robbie Salter, Dr. Robert Salter and Mr. E. Morris.
(photo by Wambolt-Waterfield)

Dr. A. H. C. Ratliff, President of the British Orthopaedic Association, who made a special oration on Hey-Groves and his contributions to Orthopaedic Surgery.



Dr. Hans Uhthoff (left) of the Canadian Orthopaedic Research Society talks to Dr. E. Simmons, President Elect, Canadian Orthopaedic Association.

Sir George Bedbrook, O.B.E., in action during internation Stoke Mandeville Games, Heidelberg, Germany, 1975.

Highlights from Canadian Orthopaedic Association and Canadian Orthopaedic Research Society Annual Meetings

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SYMPOSIUM ON THE SPINE

Backache

Low back pain remains the greatest socio-economic problem in orthopaedics in all of the developed countries. There are seven to eight million sufferers from low back pain in the United States alone, and some two billion dollars are spent on compensation each year for this condition.

Professor Kirkaldy-Willis, Saskatoon reported his extensive investigations on spinal stenosis and explained the pathological anatomy of a wide range of spinal conditions. He gave an elegant and extensive demonstration of cadaver spines illustrating the relationship between the intervertebral discs, vertebral facet joints and emerging spinal nerve roots.

Movement of the spine depends on the integrated motion between each segment which articulates anteriorly at the intervertebral disc and posteriorly at the facet joints through a centre of motion which is perculiar to each level. Defects in the facet joints lead to overloading of the intervertebral disc and consequent annular bulging, prolapse and ultimate disc narrowing. Professor Kirkaldy-Willis demonstrated the intimate relationship between the emerging nerve roots and the facet joints. He showed how progressive changes in these joints, assymetrical loading and congenital defects are accompanied by reciprocal changes in the intervertebral disc. Synovitis, degerative erosions, instability, and subluxation of the facet joints were all stages in this process. As a consequence, overloading of the disc, radial tears, disruption and osteophyte formation occured mirrored these changes. Numerous specimens demonstrated how changes in the shape of the intervertebral foramina lead to nerve root entrapment and various types of spinal stenosis.

Computerised Tomography of the Spine

Dr. W. Glen of Los Angeles demonstrated the wealth of information that awaits discovery. A pioneer in the use of "C.T." scanning of the spine, he showed examples of a typical format in which this information is presented. Axial, coronal and sagittal roentgenograms are composed by the computer in a composite series of pictures. He showed examples of many of the conditions described by Professor Kirkaldy-Willis. A routine examination requires careful elucidation. Nerve root compression, foraminal compression, post operative changes, osteophyte impingement were clearly evident without the necessity for myelography.

Comment

The main problems will be the interpretation of the data and the cost and time of obtaining this information.

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Myelography

Water soluable myelograms have now largely replaced standard myelographic technique. Complications such as arachnoiditis, headache have been diminished and excellent outlines of the nerve roots and spinal cord are now obtained. Two methods of this technique were demonstrated by Dr. P. Moreau of Edmonton.

Myeloscopy - A new way to look at the Spinal Nerve Roots

Following the original Japanese experience, Dr. M. Chapman from Toronto uses a very fine fibre optic lens system to see inside the arachnoid space. He demonstrated some fascinating features of the lumbar nerve root rootlets. Vascular changes, matting, scar tissue and the grey white deposits of Depo-medrol were examples which made us aware of the wide variety of pathology which became visible. Lively discussion followed on the use, complications and contra indications of this procedure.

Relating Pathology to Patients

Dr. H. Farfan[1] from Montreal stated that "Sciatica is a symptom and demands explanation and definitive diagnosis."

Clinical conditions such as sacro-iliac pain, trochanteric bursitis and pyriformis syndrome can often be explained by changes in the vertebral column and are examples of referred pain. The pain may arise from facet joints, annulus of the intervertebral disc and changes in the nerve root ganglia. Sometimes an isolated facet is involved, but in other instances the intervertebral disc is deranged. When the spine is compressed and the vertebral disc overloaded it may never recover its original integrity. Stages in this process are vertebral end plate fracture, explosive rupture of the disc and subsequent collapse of the disc. Nerve root compression and lateral compartment narrowing lead to leg pain. Facet injury, excessive rotation may lead to instability of arthritis, scoliosis and degenerative spondylolysis.

Traditional Methods not Outmoded

In the animated discussion which followed the excellent papers authors admitted that the pathological changes do not always correlate with the patient's symptoms and the time honoured history and careful clinical examination are still the most valuable methods of examination.

The Chronic Back Pain Sufferer - Can anything help?

Dr. I. MacNab[2] a pioneer in the treatment of backache stated that after careful clinical appraisal of each patient he assesses each problem by a sequence of logical tests. He emphasized the need to investigate the nerve root pathology.

(Arachnoiditis gives pain in unusual pathways because of the nerve rootlet adherence.) Lateral recess stenosis and foraminal stenosis require special tests. He demonstrated how he injected nerve root sleeves in such cases.

He uses special techniques including epidural venography and discography. He stated that discograms were only significant if the pain was reproduced corresponded to the patients symptoms.

Chronic Back Pain - Is a second operation worthwhile?

Dr. M. Simurda, Kingston, reviewed a 100 patients who had recurrence of symptoms after an initial successful operation and submitted to a second procedure. The commonest cause of recurrence was a second disc protrusion at the same level, 37 out of 42 of these patients were cured.

Where a pseudoarthrosis was present after a spinal fusion only about 50% success was achieved. Spinal stenosis, infection and persistent instablility were less frequently relieved by further surgery. Lack of a pain free interval, compensation, problems and psychological complications gave a poor prognosis.

Conclusions

Backache remains one of the greatest clinical challenges in orthopaedics. New tools are now becoming available which allow a better understanding of the basic pathogeneises and pathology, but much continued effort will be required to coordinate and correlate this new information.

Rehabilitation of the Spinal Injury Victim

Sir George Bedbrook,[3] opened his spinal injury unit in Perth, western Australia, a city comprised of some 300,000 people. All patients with spinal lesions were admitted to a central unit and recieved immediate attention by a team of doctors familiar with the complications and management of the spinal cord lesions.

Sir George recounted the principles he had learnt after 25 years experience in this centre which has become a model for others to follow. Expert treatment begins at the site of the accident (his organization now covers the whole of western Australia). A trained team is directed to the scene by radio and after careful initial examination the victim is transported by trained "Paramedics", by helicopter or ambulance to the special spinal centre. A team of urologists, orthopaedists and neurologists with ancillary staff are coordinated to diagnose, assess and treat all aspects of spinal cord injuries. Special emphasis is placed on the prevention of urinary complications and pressure sores. He found that cleanliness in the ward was very important and had successfully established intermittent catheterization teams, so that urinary infection, urinary reflux and urinary fistula did not occur.

Treatment of the vertebral and spinal lesions were based on a study of the pathology of the spinal cord injuries. Laminectomy was rarely required and most spinal cord and vertebral lesions could be dealt with by carefully posturing the patient. Operations for stabilization, decompression or procedures such as Halo traction were necessary in special circumstances. Careful posturing of patients allowed development of correct reflexes and a progressive program of physiotherapy and occupational therapy ensured that most patients return home to lead useful lives. A special problem existed for over a hundred quadriplegics and for these he had established a special home and sheltered workshops.

Wheelchair sports became an integral part of the rehabilitation and it is interesting that an Australian physiotherapist, Rankin Wilson, whilst working in Winnipeg in 1966 was an instigator of the Canadian participation in this field.

PROBLEM OF JOINTS

Development of the Knee Joint

Doctors M. Finnegan and H. Uhtof, Ottawa, presented graphic illustrations of the development of the human knee which they had studied by dissecting 80 fetuses.

Joint Movement - A Pioneer Speaks

Dr. R. Salter's great great grandfather, Malachai Salter, was a founder of Halifax. He showed a slide of succeeding generations of this remarkable family stating that "not one of them was noted for his modesty".

Salter's First Lesson - Joints must be Correctly and Stably Placed

Professor Salter[4] first made his impact on orthopaedics by devising a successful operation for congenital dislocation of the hip in young children. The procedure has given consistantly satisfactory results if properly performed in the correct circumstances. Many hundreds of Canadians especially native born children with dislocated hips had escaped detection when Dr. Salter was appointed head of the Orthopaedic Services of the Hospital for Sick Children in Toronto about 20 years ago. Methods of reducing and holding these children's hips had often failed even after several operations and many more were left with stiff and unstable painful joints. Dr. Salter defined the problem; first the hips had to be completely reduced into their acetabula and secondly the direction of the accetabular roof had to be realigned so that the hip would not "pop out" of the joint.

In his operation the Innominate Osteotomy a graft from the iliac bone is placed in a defect after devision of the os innominatum and thus gives you support to the femoral head which has been accurately replaced in the redirected acetabulam.

Subsequently, as a result of the early diagnosis (at birth) of congenital dislocation of the hip becoming universally recognized, most babies born with this deformity did not need this procedure. His thorough disemination of the proper management of congenital dislocation of the infant and childs hip has saved countless cripples in Canada and throughout the world.

Salter's Second Lesson - Joints Must Move

As a result of experiments on joints of animals, Dr. Salter showed that immobilization leads to breakdown of joints and if prolonged results immobilization leads to breakdown of joints and if prolonged results in adhesions, cartilage degeneration and joint stiffness.

Compression and immobilization in experimental animals provoked disastrous degeneration of the articular surface which never recovered from the insult. Movement on the other hand promoted healing and continued flexiblity of the

articulations. With such clear cut evidence it seems strange that the clinical application of these principles has been so slowly adopted. As Dr. Salter showed, rest and immobility of joints had become deeply entrenched in orthopaedic and medical tradition as the advocates of this regime enjoyed great reputations.

Salter's Third Lesson - Movement helps Joints to Heal

Continuous passive motion is a concept developed after initial experiments of rabbit joints. In a series of experiments that have now become famous, their joints were subjected to a controlled series of lesions and healing studied under various modes of treatment. It was found that even after fairly large defects were produced in the articulating cartilage, these healed by tissue closely resembling hyaline cartilage, when the joints underwent continuous passive motion. These happy health rabbits had their limbs attached to a lever which caused the knee joint to move through an arc of movement night and day. It would seem difficult to apply this system to patients, but after eight years of experiments the method has been clinically applied. Patients tolerated the procedure well (as reported by Dr. H. Hamilton of Thunder Bay) and the method is now on trial in the treatment of articular injuries and other diseases of joints.

Cartilage Preservation - Frozen Cow's Joints may provide the answer

There is a real possibility that cartilage grafts could be used to replace large articular defects resulting from excision of lesions of low malignancy. Allografts can be kept preserved in a cartilage bank. In a series of experiments, Dr. N. Schachar and Dr. F. Heard from Calgary showed that cow cartilage could be best preserved by slowly freezing the graft after incubation in a 7.5 per cent saline solution of dimemythilsul-proxide (D.M.S.O.) and subsequently storing the cartilage at −70 degrees centigrade. With this method some 40 per cent of the grafts survived on thawing. Cartilage cells enjoy certain privileges which prevent them causing the usual immune reaction so that these experiments could lead to successful application of allograft cartilage transplantation.

Surface Replacement Arthroplasty

It is over 40 years since Smith Peterson described his "mold arthroplasy" for arthritis of the hip. He devised his anterior approach while he was a resident and for 20 years or more the operation of cup arthroplasty was performed on thousands of patients on both sides of the Atlantic. The operation eventually fell into disrepute because of gradual absorption of the femoral head and protrusion of the acetabulum. Further-more Charnley's total hip operation in which two materials a high density polyethyline cup and a metal femoral prosthesis were cemented in place, gave more instant relief without the need for prolonged physiotherapy. Literally millions of these "Total Hip" operations have now been performed and Charnely's unit has published incredibly consistant good results in over 10,000 patients followed for over ten years.

Long term complications now rearing their heads are loosening and occasional prosthetic or cement failure. An effort to simplify the procedure, surface replacement operations have been enthusiastically adopted. The Wagner operation consists of inserting a low profile high density polyetheline accetabulum and a metal cup which caps the head of the femur after the rough articular surface has been replaced.

A report by Dr. J. Schatzker of Toronto was a little discouraging. In a study of 200 hips; 18 showed avascular necrosis of the femur, three dislocations, 12 loosening occurred and seven hips were revised. Discussers of this paper said it was common to see a radiolucent line around the accetabulum and in a number of these the accetabular prosthesis became clinically loose.

THE SHOULDER'S PECULIAR PROBLEMS

Does initial management prevent a Young Athletes Shoulder from redislocating?

Dr. B. Yoneda from Toronto, in a review of over 100 males who had acute dislocation of the shoulder 82 per cent had no recurrence and only 13.5 of those who did was an operation necessary. All these active athletic men were treated by swathing the arm for three weeks after initial reduction, followed by a further three weeks wearing a sling.

This follow up covered a period of 22 years, an average of 13 years. So that the message seems clear that if a young athlete dislocates his shoulder for the first time, *he should have it immobilized* for five weeks and must not participate in sports for a period of at least six weeks. If this regimen is carried out then he has an 80% chance of avoiding recurrence or operation.

Older Patients Shoulders - How serious is an Anterior Dislocation?

Anterior dislocation in the older patient is a different problem from the young adult. Dr. R. Hawkins *et al* from London found that 90 percent of patients aged 40 to 83 had associated rotator cuff tears. Other associated lesions included brachial plexus injuries and bicep tendon tears. Despite these findings of complex pathology, these patients did well. Recurrence after dislocation was rare and the results of repairing unstable shoulders were good if impingment of the rotator cuff was prevented.

Rotator Cuff Tears - Should it be repaired?

Codman's[5] famous monograph outlines most of the pathological changes and anatomy of the rotator cuff. Subsequent authors havesstressed the precarious blood supply of the supraspinatus, emphasized the unpredictable results of surgery. Recent papers have suggested supraspinatus muscle advancement or major reconstructive procedures. Dr. P. Earnshaw *et al* from Ottawa achieved 65 percent in repairing rotator cuff defects on 27 patients, but on careful analysis a significant number of these successful cases show radiological evidence that a sizable defect in the cuff remained.

In a general discussion of this paper authorities felt that the rotator cuff repair should be simple, accompanied by division of the acromio clavicular ligament and decompression of the rotator cuff. Careful supervision of the rehabilitation program was also emphasized.

The Frozen Shoulder - When will it ever move?

There is no mistaking this syndrome. It general affects women, comes on insidiously and may be bilateral. It passes though the phases of freezing, frozen, and thawing . The

condition was first described in 1872 and remains mysterious. Dr. A. Edmonds *et al* from Kingston, had 85 percent success in 113 patients by manipulating these shoulders and injecting intra-articular Cortisone. Those that did badly had no glenohumeral adhesions at the time of manipulation.

PROBLEMS OF THE KNEE

Can the Cruciate Ligament be repaired successfully?

Dr. P. Beaver *et al,* Calgary, attempted to solve the question by using a computer to analyze the results of surgical repair versus excision of the anterior cruciate ligament in 650 patients treated in five different hospitals. These results (taken from patients treated between 1966-1978) were surprising. Patients who had a cruciate ligament repair had more pain and less movement than those in which the ligament was not repaired or excised.

Criticism of this paper was strong. Dr. D. MacIntosh and others pointed out that the computer confused and did not resolve the issue.

The operations were undertaken by 15 different surgeons at five different hospitals; no standardized techniques were used and many of the presently accepted techniques were not available at the time.

Anterior Cruciate Ligament Repair - Q.P.O.T. "Quadriceps Patella over the Top".

Dr. W. Stanish of Halifax, reported the results of repairing the torn anterior cruciate ligament in male athletes using a standardized technique. In this method a portion of the patella tendon is used to augment the torn ligament and brought over the top of the lateral condyle of the femur after it has been treaded through the knee. The knee is held in a cast for some six weeks post-operatively and a rehabilitation program instituted. Before operation 65 percent of the knees gave way, all had "pivot shift" sign of anterior cruciate instability. Follow up showed that all but three athletes returned to their competitive sport and all returned to work. About 15 percent still had some symptoms of "giving way of the knee."

Dr. D. MacIntosh, who invented this procedure stated that definitive surgery had changed the prognosis from these injuries. He preferred the lateral substitution procedure which did not interfere with the quadriceps tendon and he had no experience of using Dacron which was used by Dr. Stanish *et al* in some of their replacements as a reinforcement for the new ligament.

Posterior Cruciate Ligament - Dynamic Repair

Repair of the cruciate ligament has proved technically difficult. However, Dr. J. Kennedy, a well known authority on ligamentous injuries reported an ingenious method in which the medial portion of the gastrocnemius muscle is attached to a polypropylene leader and fashioned to provide a dynamic replacement against the posterior desplacement of the knee.

Arthroscopic Surgery - "Not only saves an incision it saves time, pain and money"

The first successful arthroscopic meniscetomy was performed in 1962 by Watanabe in Japan. Pioneers in this field, O'Connor, Metcalfe, McGuinty, Carson, Jackson have established standardized methods and developed special instruments. A motorized meniscal cutter is available to tidy up any remnants. Essentials for success are a good lighting system, adequate irrigation and the ability to perform the operation using a triangulation technique. With this procedure the arthroscope is introduced into one side of the joint and the arthroscopic instruments pass into the knee on the opposite side. Dr. B. Day, Vancouver, gave results of his first 86 arthroscopic meniscectomies. Average hospitalization time is one to two days and average time of return to work is four days compared to four to ten weeks of work in compensation cases using standard techniques. He estimated that in the Province of British Columbia, it would save 3.5 million dollars each year in hospital costs if this method was adopted.

The Painful Patella

Professor P. Ficat[7], Toulouse, France has written widely on this subject and developed the hypothesis of excessive lateral pressure. He advocates roentgenographs of the patella in 30, 60 and 90 degrees knee flexion. Changes in the lateral compartment include bone cysts, loss of joint space and laterations of the trabecular pattern. The professor traced the evolution of the process which proceeded to osteoarthritis. He advocated quadriceps exercises, and anti imflammatory drugs. He advised a change in biomechanics by lateral release or other methods to restore the patella to an improved position. He reported 80 percent success in 144 cases by performing the lateral release procedure.

Moving the Patella Tendon

The principle of the Maquet[8] operation is to displace the patella attachment anteriorly thus decreasing the pressure on the patella during extension of the knee. Dr. L. Heller *et al* Montreal used a wedge method of tibial osteotomy which was followed by some hair raising series of complications. Dr. F. Langer described a simpler method of achieving the same objective without complication.

Overuse Syndromes

Many of the problems in athletes knees result from an inappropriate training and over optimistic attitudes. Dr. P. Fowler, London, Ontario, found that 43 percent of 800 athletes attending the Sports Injury Clinic in Victoria Hospital had knee complaints. Apart from acute injuries stress syndromes we syndromes were the commonest problem and most of these resulted from patella femoral derangement. Accurate assessment, prevention and appropriate preparation for each sport was essential and surgery should be reserved for specific situations.

NEW TECHNIQUES

Microvascular Surgery - Has it a place in Orthopaedics?

Following the original work in China on reimplantation of limbs microvascular surgery has developed into a flourishing addition to surgical techniques. Development of micro surgical research centres has been world wide and anostomosis of vessels of less than one millimeter is now accomplished with a very low failure rate. O'Brien[9] has developed a special centre in Melbourne, Australia, he reports on the successful digital reimplantation, toe to hand transfer, free flap and omental transfer and lymphatic anostomosis. Free bone and joint grafts using a rib or fibula totally detached from their site of origin and transferred to a new site and anastomosed to a new blood supply have been

sucessfully accomplished. In this textbook, he records examples of fibula transplantation for Kyphoscoliosis, bone and muscle grafts and joint replacements. Muscle transfers and nerve repairs enlarge the scope of this horizon which will revoluntionize many traditional surgical concepts. Already many of these microsurgical techniques have been developed in different centers.

Canadian Experience - Vascularized Fibula Graft for non union

Successful vascularized free fibula grafts were reported by Dr. P. Gropper et al of Vancouver, in cases of established non union. Successful anastomosis of the free fibula graft was achived in 12 cases which were studied by Bone Scan and labeling. The advantages of early restoration of continuity of the bone where a gap or infection existed with minimal mobility made this micro-surgery worthwhile. A stress fracture occurred in one fibula graft.

Bone and Joint Defects

Free fibula grafts were also used to replace large boney defects created after excision of malagnancies by Dr. S. Esses *et al* of Toronto. Four patients were treated by massive autogenous non vascularized graft supplimented by the free anastomosed fibula and three received the vascularized graft alone. Although recurrence of the tumor occurred in one case, all transplants proceeded to bone union and in one instance a joint transfer was also successful. Vascularized osseus transplantation seems to be indicated when a massive bone defect needs to be filled. Complications such as stress fracture, the need to supplement the junctional zone with autogenous grafting, and the associated necessity to ensure patency of the anastomosis make the procedure technically demanding. The authors pointed out if the free bone or combined muscle and bone graft microcirculation becomes thrombosed the graft does not behave like the usual non vascularized graft. It does not stimulate bone formation.

Can Epipyseal Plates be Transferred?

Dr. R. Cruess *et al* from Montreal in a series of delicate experiments in dogs showed that an epiphyseal growth plate can be successfully transplanted provided it is vascularized by microvascular austomosis. The growth plate continues to grow at approximately 85 percent of its normal capacity.

Allografts - Can Vascularized Bone Allografts be successful?

Dr. T. Phillips *et al*, London, Ontario, showed conclusively that although bone allografts can be successfully anastomosed. Immunity reaction causes a thrombosis of the vessels and the graft dies.

Kyphosis - Corrected by Massive Graft

Dr. P. Dupuis of Montreal reported the use of an 18 centimeter free fibula graft in a patient with severe kyphosis. The case was similar to the one reported by O'Brien and Ostrup.

Comment

Vascularized free fibula graft appears to be a new tool in orthopaedics.

Electromagnetic Stimulation of Bone

Electrical stimulation of bone has been successful in cases of acquired non union or congenital pseud arthrosis. Techniques include invasive procedures such as inserting two cathodes or an osteostim (a helical wire) at the fracture site, or non invasive methods. In the later system devised by Bassett[10] *et al* the affected site is subjected to a pulsating electromagnetic field by placing a suitable current in coils placed at the appropriate site on each side of the affected limb.

The role of electromagnetic pulse stimulation in acute fracture healing was investigated by Dr. Shim, Vancouver. He found significant acceleration of healing in acute fractures produced in dogs compared with control identical fracturers. This is the first report of htis finding and could lead to significant clinical application.

TRAUMA PROBLEMS

Multiple Trauma

Dr. R. McMurtry *et al* reviewed 115 deaths that occurred from the 635 patients admitted to the Sunnybrook Hospital Trauma Centre in Toronto. By scoring marks for severity injury, they could predict the probable outcome. Head injuries and injuries of the central nervous system were the commonest cause of death and death was rarely preventable in these severe injuries.

Pelvic injuries and multiple injuries of the extremities are some of the conditions in which skill and immediate treatment may save lives. Energetic investigation of pelvic hemorrhage by arteriorgrams may play an important role in this life threatening situation.

Fractures of the Lower Half of the Femur

Dr. J. Waddel *et al* from Toronto reviewed four types of fracture - Transverse, oblique, comminuted and pathological. There was no overall universally successful method of treatment. Open reduction and fixation in 28 patients allowed correction of the varus angulation and early ambulation, but there were eight implant failures and two non union. Traction and cast brace methods were used in 48 cases resulted in five failures and 13 had varus angulation. These authors advocated new methods such as internal fixation by Enders Rods and encouraged surgeons to devise better methods for management of these fractures.

Traumatic Dislocation of the Hip

Dr. C. Offierski *et al* Toronto stated that the childs hip requires less trauma to dislocate than an adult. It is vital to ensure that the hip was adequately reduced. Even after successful treatment the hip might show coxa magna (enlargement) although this did not interfere with function.

The Windswept Ones

Dr. R. Letts *et al* of Winnipeg reviewed the windswept or 'windblown deformity'. This is a severe deformity that occurs in mentally retarded children with severe cerebral palsy. As if they had become bent by the wind one hip abducts and the other adducts and the spine becomes curved making it almost impossible for the patient to sit. Dr. Letts *et al* found the initial step in this devastating deformity was instability and dislocation of one hip. If this was prevented the deformity was aborted.

Downs Syndrome

Dislocation of the hips in this condition was described ten years ago and occurs in five percent of all institutionalized Down's patients. Rang advocated regular examination of hips in all Down's Syndrome children.

PAEDIATRIC PROBLEMS

Deformity after Supracondylar Fractures of the Humerus

Dr. H. Labelle *et al* Montreal found 25 such cases amongst some 450 fractures they analysed. They found that the varus deformity often occujs in plaster after the fracture has been reduced and they developed the standardized radiological technique to detect this deformity.

Fractures of the Radial Neck

Dr. J. Wedge *et al* Saskatoon found a surprisingly high complication rate when this fracture was reduced and fixed by transcondylar pin.

Ipsilateral Fractures of the Femur and Tibia

Dr. J. Hyndman *et al* Halifax pointed out the seriousness of this combination. In their series treated at the Izaak Walton Killam Hospital for Children many such children had associated injuries. The authors found a high complication rate and particularly noted a leg length deficiency in some children who had an unrecognized on con current epipyseal injury.

Perthes Disease

Dr. J. Bowen *et al* of Wilmington, Delaware reported on a computerized analysis in 400 patients with Perthes Disease were evaluated at the Alfred Dupont Institute over a 40 year period. They domonstrated the relationship between physeal closure, metaphyseal adaptation and acetabular remodeling.

Varus osteotomy was contra-indicated if physeal closure was impending. They placed particular importance on the shape of the developing femoral head.

AMPUTATIONS

Myoelectric Prosthesis

Dr. R. Scott, an engineer in Fredericton, New Brunswick, has an electronic system that repsonds to the electromyographic changes in normal muscles. After initial experiments of animals he has now developed a system in which the wearer can use a single muscle to move his prosthesis for opening and closing. The myoelectric arm is carefully engineered to be cosmetically acceptable and fits on a below elbow or an above elbow stump. After a period of training the wearer can use the arm almost like a normal limb by motivating his biceps (or whatever muscle is used) to open and close his artifical hand. Dr. E. Gozna an Orthopaedic Surgeon is working closely with Dr. Scott on his project in New Brunswick, where a BioEngineering unit has become established. Since 1971 32 "UNB" prosthesis have been fitted in eight different centres and all are functioning. Ages of patients range from three to 42 years and 60 percent have been fitted to children.

CONCLUSION

The unique combination of the Canadian Orthopaedic Association and the Canadian Orthopaedic Research Society presented a wealth of information which will bring changes to our methods of managing orthopaedic problems in the future. □

References

1. **Farfan H.** *Mechanical disorders of the low back.* Lea & Febeger, 1973
2. **MacNab I.** *Backache.* The Williams and Wilkins Co., Baltimore, 1979
3. **Bedbrook G.** *The Care and Management of Spinal Injuries.* Springer Verlag, New York, 1981
4. **Salter R B.** *Textbook of Disorders and Injuries of the Musculo Skeletel System.* The Williams and Wilkins Co., Baltimore, 1970
5. **Codman E A.** *The Shoulder,* Boston, Mass, 1934
6. **Watanabe M, Takeda S and Ikeuchi H.** *Atlas of Arthroscopy.* Igaku Shoin Ltd., Tokyo, 1969
7. **Ficat P R.** *Disorders of the Patella Femoral Joint.* Williams and Wilkus, Baltimore, 1977
8. **Maquet P.** Advancement of the Tibial Tuberosity. *Clin Orthop* 1976; 115-225.
9. **O'Brien B McC.** Microvascular Reconstructive Surgery. Churchill and Livingstone, 1977
10. **Bassett C A L, Pawluk RJ and Pill AA.** "Non operative salvage of surgicall resistant pseudarthrosis and non union by pulsating electro magnetics fields." *Clin Orthop,* 1977; 124-128

Peritoneal Dialysis

TEN YEARS EXPERIENCE AT SAINT JOHN, NEW BRUNSWICK

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SUMMARY

Clinical Experience with both intermittent peritoneal dialysis and continuous ambulatory peritioneal dialysis over a period of seven and three years respectively at Saint John, New Brunswick, is evaluated.

Biochemical and haematological data are presented. Hypertriglyceridaemia and obesity are uncommon in our series. The frequency of peritonitis, in patients on CAPD, improved with the introduction of Perilock Titanium adaptors and the staff supervised tubing change.

INTRODUCTION

In the last decade, interest in maintenance peritoneal dialysis for the treatment of chronic renal failure has grown considerably with the introduction of a permanent silastic Tenckhoff catheter, which provides a safe access into the peritoneal cavity.[1] In the early 1970s dialysis was performed intermittently, either by manual "bag method" or by different automatic devices such as reverse osmosis and cycler. The procedure involves the instillation of a two litre dialysate which is allowed to drain after a dwell time of 20 to 30 minutes. In all, 60-80 such cycles per week, in three or four divided schedules, are considered optimal.

In 1978, Popovich and his associates described a technique of continuous ambulatory peritoneal dialysis as another method of treatment for chronic renal failure.[2] In this techiniqe, the patient retains the dialysate in the peritoneal cavity continuously around the clock, seven days a week, except at times the patient drains the fluid and instillates a fresh solution on four to five occasions in 24 hours. Many improvements in this method have already been made, by the substitution of glass bottles with rollable plastic bags (Baxter-Dianeal)[3] and by the introduction of special length patient lines with modified clamps and spikes. The newer connecting systems using Titanium adaptor (Travenol) and self sterlizing closure devices for the Tenckhoff catheter have also helped in reducing the incidence of peritonitis, a frequent problem in patients on peritoneal dialysis.[4,5]

This paper describes our experience in the treatment of patients with chronic renal failure over a ten-year period by both intermittent and continuous peritoneal dialysis methods.

METHODS

The dialysis program for the treatment of patients with chronic renal failure was initiated in June 1971 at Saint John, New Brunswick. Within the past 9 1/2 years ending December 1980, 152 patients with end-stage renal disease were managed by different modalities of dialysis: haemodialysis, intermittent and/or continuous peritoneal dialysis, and transplanation.

Between June 1971 and February 1974, the patients either awaiting a vacancy in the Haemodialysis Unit or being evaluated for renal transplantation, received peritoneal dialysis through a temporary catheter. Subsequently, however, patients chose peritoneal dialysis as an alternative to haemodialysis when the insertion of a permanent peritoneal catheter became possible. The acceptance of peritoneal dialysis was essentially motivated by the socio-medical conditions but our discussions on the merits of home peritoneal dialysis might have some bearing on their decisions.

Beginning July 1978, the technique of chronic ambulatory peritoneal dialysis (vide supra) was introduced and majority of our new patients were initiated on this program. The patients received a daily diet with adequate protein (1 gm/kg BW), low sodium (60 to 80 mEq), and moderate fluid restriction. All patients also received nutritional supplements of vitamins, folic acid and calcium. Each patient was advised to use dialysate with 1.5% glucose without an addition of potassium. Where indicated, hypertonic dialysate solution (4.25% glucose) was used to maintain their fluid balance. Phosphate binders were used in accordance to the serum phosphorous values. For patients with diabetes, insulin was added to the two-litre dialysate (5 units to 1.5% or 12 units to 4.25%, respectively). Heparin 500 units per exchange was used only when cloudy drainage was noted.

The records of all patients who received peritoneal dialysis over the past 9 1/2 years were reviewed, and those receiving peritoneal dialysis for a period less than one month were excluded. No patient with widespread malignancy and renal failure was accepted in our dialysis program. The pre-dialysis and dialysis data on all patients were analyzed. The training period for home dialysis and the number of hospital days the patients stayed subsequent to their training were counted for both intermittent peritoneal dialysis and chronic ambulatory peritoneal dialysis.

The peritoneal fluids were examined for cell count and cultured each month or when the patient presented with cloudy drainage for aerobic, anaerobic organisms and fungi. Blood cultures were done in patients with temperature exceeding 38°C. The complications of peritonitis and the causes of death were determined.

The treatment of peritonitis changed over the years. Initially, Cloxacillin was started in all patients pending culture and sensitivity reports but, beginning July 1979, the Cephalosporins and gentamycin in the dosage of 200 mgs and 6 to 10 mgs respectively, per 2L dialysate, were used for all symptomatic cloudy drainages unless culture and sensitivity reports suggested otherwise.

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RESULTS

The records of 52 patients on peritoneal dialysis, representing 33% of all patients with end-stage renal disease on the dialysis program at Saint John, were analyzed. During the first 3 years of our program there were 14 patients who received peritoneal dialysis through temporary catheter and then moved to haemodialysis unit or received renal transplant.[6] Of this group, seven patients were placed on centre haemodialysis and one was successfully trained to do haemodialysis at home. Six patients were given a renal graft which functioned optimally thereafter. Between February 1974 and December 1980, 38 patients were maintained on either chronic intermittent peritoneal dialysis or chronic ambulatory peritoneal dialysis through permanent peritoneal catheter. There were 16 males and 22 females with a mean age of 59 years and 11 months (range 28-80 years). The primary considerations on selecting peritoneal dialysis in this group of patients is shown in Table I. The causes of renal failure in these patients are also listed. The creatinine clearance was between 4 and 6 ml/min in 27 and less than 4 ml/min in the remaining 11 patients.

Fourteen patients were trained for chronic ambulatory peritoneal dialysis (CAPD) at home and the remaining 24 received intermittent peritoneal dialysis (IPD) (13 at home and 11 in the hospital). The average training period for CAPD and IPD were determined to be nine and fourteen days respectively. The average number of days during initial admission including training period and then during subsequent hospitalizations is given in Table II. As expected, the patients on hospital intermittent peritoneal dialysis had multiple admissions. The mean follow-up for CAPD, IPD home and IPD hospital was noted to be 13.2, 11.8 and 11.2 months, respectively. Three patients from IPD hospital were transferred to haemodialysis after 7, 14 and 18 months of peritoneal dialysis, respectively. This became necessary because of recurrent peritonitis and catheter blockage in two patients, and in preparation for renal transplantation in one patient. Two patients on long term haemodialysis ($8^1/_2$ and 8 years) were transferred to CAPD, but none of the CAPD patients chose to receive other types of dialysis.

Both haemotological and biochemical parameters as recorded at 4 months after the beginning of Intermittent Peritoneal Dialysis or CAPD and thereafter, are shown in Table III.

The major complication of peritoneal dialysis through permanent peritoneal catheter is related to infections such as peritonitis. These are given in Table IV. Among 20 positive cultures in the peritoneal fluid in patients on IPD, only two grew gram negative organisms, whereas in patients on CAPD, the growth of gram positive and gram negative organisms was noted with equal frequency. In addition to peritonitis, subcutaneous tunnel infection in one and catheter

TABLE I

Underlying Renal Disease	Patients On CAPD	Patients on IPD	Primary Considerations for Peritineal Dialysis: Elderly*	Cardiopulmonary Status	Vascular Acess	Social
Glomerulo-nephritis	2	3	2	1	1	1
Pyelo/Interstitial nephritis	5	9	4	3	—	7
Hereditary nephritis	1	—	—	—	1	—
Polycystic Renal Disease	—	1	—	—	—	1
Diabetes Mellitus	1	6	3	—	2	2
Hypertension Nephrosclerosis	2	4	1	3	—	2
Systemic Renal Disease	3	1	1	1	1	1
TOTAL:	14 (9 male, 5 female)	24 (7 male, 17 female)	11	8	5	14
AGE	56.5 years (29-80)	62years (35-76)				

* over age 70.

TABLE II

Type Dialysis	Initial Hospital Stay and (Training Period)	Sebsequent Hospital Days per Patient/year	Average Follow-up Period (months)	Patient Status December 1980
CAPD (14)	26 days (9 days)	23.3	13.2 (3-29 mos)	* 12
IPD				
Home (13)	22 (14 days)	48.4	11.8 (3-27 mos)	2
Hospital (11)	36.9	101.6	11.2 (1-20)	1

exit site infections in an additional three were also recorded.

Beginning April 1980, we introduced the connecting system utilizing peri lock Titanium catheter adaptors and the program of staff supervised tube change every four weeks. Around the same time, our microbiology service adopted the peritoneal fluid culture steps as described by Vas and Oreopoulos.[7] These modifications have reduced both the frequency of peritonitis and the yield of organisms on culture. During the last nine months, ending December 1980, there were only nine episodes of peritonitis during 102 patient months on CAPD, an improvement over the preceding 21 months when 27 episodes had been recorded during 83 patient months.

Seventeen catheters (5 in CAPD, 12 IPD) were revised in 12 patients (4 CAPD and 8 IPD) because of catheter malfunction.

Of 38 patients on peritoneal dialysis, 20 including three transferred to haemodialysis, died during the seven-year period. The overall mortality in the IPD group was strikingly worse over the CAPD group. Of 21 IPD patients, only three are currently alive at their 14, 20 and 27 months of dialysis. On the other hand two patients on CAPD had died at their 3 and 9 months of dialysis. Cardiovascular disorders were the most frequent cause of death and it was followed by malnutrition and infections (Table V). Two patients died of haemorrhage and one suffocated on a piece of meat in the trachea. None of our patients withdrew the treatment. However, the clinical features of anorexia, vomiting, lethargy in five patients (2 diabetics, 2 elderly, and one with polyarteritis nodosa and pneumonia) though essentially related to systemic disorders, were also assessed to be psychogenic in character.

TABLE IIIA

LABORATORY DATA*

IPD TIME	Nos. of Patients	Blood Urea Nitrogen	Creat-inine	Calcium	Phos-phorus	Protein	Albumin	Trigly-cerides°	Choles-terol	Alkaline Phos-phatase+	Haema-tocrit#
(Normal Range)		**8-23**	**0.7-1.4**	**8.8-10.3**	**2.1-4.0**	**5.6-7.8**	**3.5-5**	**10-250**	**140-310**	**75-180**	**38-50**
		mg/dl	mg/dl	mg/dl	mg/dl	g/dl	g/dl	mg/dl	mg/dl	IU/L	%
INITIAL	24	103.	12.9	7.95	6.3	5.6	3.08	142.	178.	155.6	23.3
4 months	20	70.65	11.8	8.76	5.15	5.94	3.2	205.8	182.7	158.3	22.9
8 months	13	91.6	11.6	8.6	4.4	5.6	2.9	188.5	148.	155.2	23.1
12 months	11	88.7	12.9	8.6	5.6	6.0	3.28	137.	252.	107.1	23.0
18 months	5	92	12.1	9.4	5.3	5.9	3.3	179.	260.	138.	23.2
24 months	1	103	12.4	8.8	4.5	5.8	3.3	195.	242.	144.	33.6+

*Results presented as mean values.
In all 19 Units of packed red cells given to these patients, + One patient had consistently elevated haematocrit ranging 33% to 45%.

TABLE IIIB

LABORATORY DATA*

CAPD TIME	Nos. of Patients	Blood Urea Nitrogen	Creat-inine	Calcium	Phos-phorus	Protein	Albumin	Trigly-cerides°	Choles-terol	Alkaline Phos-phatase+	Haema-tocrit#
(Normal Range)		**8-23**	**0.7-1.4**	**8.8-10.3**	**2.1-4.0**	**5.6-7.8**	**3.5-5**	**12-250**	**140-310**	**75-180**	**38-50**
		mg/dl	mg/dl	mg/dl	mg/dl	g/dl	g/dl	mg/dl	mg/dl	IU/L	%
Initial	14	117	20.4	8.7	6.8	6.14	3.3	235.0	182.0	116.7	24.6
4 Months	13	59	10.5	8.98	3.76	6.15	2.9	319.6	238	138.9	25.1
8 Months	13	45	9.9	8.46	3.71	5.50	2.81	300.	225.	135.7	25.4
12 Months	9	50	9.5	8.72	4.06	5.68	3.11	249.	218.	145.	26.7
18 months	3	56.3	10.6	8.9	3.5	5.46	2.93	231.	195.	124.	25.8
24 months	2	56.	11.5	8.8	4.2	5.6	3.4	244.	198.	132.	25.6

*Results presented as Mean Values.
No Blood Transfusion.
+ One patient with Amyloidosis and high alkaline phosphatase excluded.
° Only two patients had Triglycerides exceeding 500 mg/dl

TABLE IV

PERITONITIS DURING PERITONEAL DIALYSIS MICROBIOLOGICAL DATA

Type of Dialysis	No. of Paitents	Patient Months	Patient Months Per Infection	Symptomatic			Asymp-tomatic	
				Aseptic	Gram + ive	Gram - ive	Gram + ive	Gram - ive
IPD*	24	277	9.5	5	6	—	12	2
CAPD+ Pre-Titanium Adaptor	11	83	3.1	12	4	7	4	—
Post-Titanium Adaptor and Tube Change By Staff	12	102	11.3	2	3	2	1	1

*Intermittent peritoneal dialysis. *Staphylococaus epidermidis* 18, *Staphylococcus aureus* 1, *Enterococci*-1; *E. coli* —2; Diphtheroids-3. +Continuing Ambulatory Peritoneal Dialysis. *Staphylococcus epidemidis* —10; *Slaphylococcus aureus* 1; B-*Streptococcus*-1; *E. coli*-4; *Enterobacter cloacae*-1; *Acinetobacter calcoaciticus*-2; *Seratia liquifacieus*-1; *Klebsiela oxytoca*-1; *Klebsiela pneumoniae* 1.

TABLE V

MORTALITY

Causes:		
Malnutrition	4	
Cardiovascular	9	(Myocardial Infarction 4, Arrythmia 2*, Pericorditis 2, Pulmonary Edema 1)
Haemorrhage	2	(Gastrointestinal 1, Intraperitoneal 1)
Infections	3	(Pseudomembranous Colitis 1, Pneumonia 1*, Peritonitis 1)
Cerebrovascular Accident	1	
Aspiration	1	

*Patients on CAPD

DISCUSSION

A large majority of patients considered unsuitable for haemodialysis in the past can now be maintained on peritoneal dialysis. In some respects, peritoneal dialysis provides definitive advantages in the treatment of end-stage renal disease. The ease with which many patients could be trained to go on home intermittent peritoneal dialysis was well described by Fenton *et al.*[8] This has been further enhanced by the introduction of CAPD. The concept of CAPD with its physiological implications, freedom from all mechanical equipment and unlimited ambulation has motivated many reluctant patients in choosing home dialysis. The patients with unstable cardiac haemodynamics and unsatisfactory angio access for haemodialysis, and those with no helper to go on haemodialysis or peritoneal dialysis at home, can hope to become master of their own treatment with CAPD.

As it had been predicted by Tenckhoff,[9] 25% of patients in our renal program were placed on peritoneal dialysis and this percentage is gradually increasing. So far we have limited the peritoneal dialysis for the elderly, small built individuals and those who have inadequate vascular access for haemodialysis. All diabetics and patients with severe cardiopulmonary symptoms are encouraged to go on CAPD. Social considerations place a significant impact on our decision and these often relate to the distances these patients have to travel and to the inability of the elderly people to understand the mechanics of haemodialysis or dialysis devices for home training.

As given in Table II the average follow up on patients on CAPD and IPD was essentially similar, but the outcome in terms of mortality was much less in patients on CAPD. Improved clearances leading to steady state in these patients were well demonstrated with the biochemical data recorded at four months on dialysis and thereafter. The most striking improvement was noted in serum phosphorus level which corresponded satisfactorily to the improved BUN and creatinine values in patients on CAPD. Phosphate binders were used in much less amount in these patients compared with those on IPD. The degree of biochemical control of uremia achieved with IPD in our series was surprisingly comparable to that with CAPD. We believe, the schedule of frequent peritoneal dialysis with variable dwell time (range 30 min to 45 min) in the presence of some residual renal function (creatinine clearance greater than 3ml/min.) in two-thirds of these patients might be an operative factor. We were also encouraged with the steady haematocrit these patients held. The blood transfusion to keep haematocrit over 28%, to avoid ischemic chest pain however became necessary in patients on IPD.

The main porblem in peritoneal dialysis remains to be the high frequency of peritonitis.[10] The diagnosis of peritonitis in our patients was based on clinical presentation, the presence of cloudy drainage and/or the growth of micro-organisms from the peritoneal fluid. Many patients were asymptomatic in the setting of positive culture reports, however inadequate bacteriological examination might be responsible for negative culture results in some of the symptomatic peritonitis. We support the steps provided by Vas and Oreopoulos, for improving the yield of positive culture.[7] Aseptic peritonitis either due to chemical irritants or toxic substances in the dialysate does occur and is diagnosed generally by the criteria of exclusion. Endemic peritonitis of this type has also been reported.[11] In our CAPD group one patient with aseptic peritonitis was found to have pseudomembraneous colitis which responded to Vancomycin and resulted in clearing of cloudy peritoneal drainage.[12] The frequency of peritonitis significantly decreased following the introduction of Perilock Titanium adaptors and the staff supervised tube change. Our observations on the reduction of the incidence of peritonitis with this technique is similar to the experience reported by Nolph *et al.*[13] Dialysate glucose absorption in patients on dialysis, particularly in the CAPD, patient is liable to result in

high triglyceride levels. But in our series Hypertriglyceridaemias (serum triglycerides exceeding 500 mg/dl) was noted in only two patients on CAPD. Obesity was equally uncommon and we believe that dietary instructions helped achieve these goals. □

ACKNOWLEDGEMENT

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References

1. Techkhoff H, Scheckter H. A Bacteriologically Safe Peritoneal Access Device. *Trans Amer Soc Artif Intern Organs* 1968;**14:**181-6
2. Popovich R P, Moncrief T W, Ghods A J, Twardowski Z J, Pyle W.K. Continous Ambulatory Peritoneal Dialysis. *Ann Intern Med* 1978; **88:**449-56.
3. Oreopoulos D G, Robson M, Izatt S, Clayton S, Deveber G A. A Simple and Safe Technique for Continuous Ambulatory Peritoneal Dialysis (CAPD) *Trans Am Soc Artif Intern Organs.* 1978; **24:**484-7.
4. Moncrief T W, Rutherford C E, Sorrels PAT, Bailey A, Popovich R P. Technical Aspects of Continuous Ambulatory Peritoneal Dialysis New Connection Devices Developed by Baxter Travenol Laboratories, *CAPD International Symposium,* 1979 Paris, 79-81.
5. Sherman R A, Longnecker R E, Davis V. Initial Experience With a Quick Connect/Disconnect Device for Chronic Peritoneal Dialysis. *Dialysis & Transplant* 1980; **8:**665-66.
6. Handa S P, Tewari H. Home Peritoneal Dialysis. *Can Med Assoc J* 1977; **116:**1123.
7. Vas S I, Oreopoulos D G. Microbiological Diagnostic Approach to Peritonitis of Continuous Ambulatory Peritoneal Dialysis Patients. *CAPD International Symposium* 1979, Paris 245-47.
8. Fenton S S A, Cattran D C, Barnes N M, Wangh K T. Home Dialysis: A Major advance in promoting home dialysis. *Trans Amer Soc Artif Intern Organs* 1977; **23**:194.
9. Tenckhoff H. Peritoneal Dialysis Today: A new look. *Nephron* 1974; **12:**420.
10. Rubin J, Rogers W A, Taylor H M et al. Peritonitis During Continuous Ambulatory Peritoneal Dialysis. *Ann Intern Med* 1980; **92:**7-13.
11. Karanicolas S, Oreopoulos D G, Izatt S et al. Epidemic of Aseptic Peritonitis Caused By Endotoxin During Chronic Peritoneal Dialysis. *N Eng J Med* 1977; **296:**1336-7.
12. Handa S P, Greer S. Pseudomembranous Colitis and Cloudy Drainage in Patients on Peritoneal Dialysis. *Dialysis and Transplantation* (in press)
13. Nolph K D, Sorkin M, Rubin J, Arfania D, Prowant B, Fruto L, Kennedy D. Continuous Ambulatory Peritoneal Dialysis: Three Year Experience at One Center. *Ann Intern Med* 1980; **92:**609-13.

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HOME CARE

The Senior Citizens Secretariat, P.O. Box 2065, 1740 Granville Street, Halifax, N.S., B3J 2Z1, has been charged with the responsibility of developing two home care demonstration projects in Lunenburg and Pictou Counties. Initially services provided will consist of homemakers and home nursing. Other services may be added as the demonstration proceeds but in the beginning home care will be confined to these two core services. The demonstrations began August 3, 1981 and will be monitored by the Senior Citizens Secretariat during the year of demonstration. A decision will then be made regarding the extension of the projects throughout the province.

A detailed report of the projects will be published in a subsequent issue of The Nova Scotia Medical Bulletin.

Those wishing further information regarding Lunenburg County should contact:

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Screening for Tay-Sachs Disease in Nova Scotia

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INTRODUCTION

Tay-Sachs disease (TSD) is a fatal and untreatable autosomal recessive disorder of childhood resulting from a metabolic abnormality in glycolipid metabolism. Incidence of the disease is greatest among persons of Ashkenazic Jewish descent. Carriers of the condition and carrier couples-at-risk for having affected children can be detected by means of a serum enzyme assay[1,3] and numerous screening programs have been undertaken in Ashkenazic Jewish communities throughout the world to identify carriers of the TSD gene[4,8]. These screening programs have generally had three interrelated objectives. First, that the individual understand the implications for himself and his descendants of being a carrier of TSD; second, that the program achieve as high a compliance as possible among prospective parents; and third, that the likelihood of psychological harm to those identified as carriers be reduced to a minimum.

We report a screening program designed to meet these objectives by attracting the participation of young adults currently living in the Halifax/Dartmouth area because of university attendance.

METHODS AND MATERIALS

A) Pre-screening preparation

Community preparation prior to the week-long screening program had both low-key promotional and educational features. An information notice was placed in the university and community press, and posters were placed in university buildings. Each individual or family in the Halifax Jewish community received a single notice and an information brochure on TSD by mail. The rabbis were asked to mention the program during Sabbath services. During the week of the screening program, public radio and TV provided brief news coverage. Practising physicians in the Maritimes were informed of the program by means of a descriptive notice that also invited referrals and which was placed in *The Nova Scotia Medical Bulletin*[9].

B) Clinic procedure

The clinic was held at the Dalhousie University Health Services, a centrally-located facility, readily accessible to students and families alike. It was open daily from 9 a.m. to 5 p.m., appointments were not necessary and there was a $2.00 fee for the service. The clinic was staffed by personnel from the University Health Service and part-time by lay volunteers from the Jewish community.

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Persons who came to be screened (43 in total) were asked to complete a questionnaire at the clinic. For comparative purposes a random selection of 27 young Jewish adults who did not attend the clinic were chosen from the same mailing list used to promote the clinic. These latter individuals were personally interviewed by senior nursing students in the B.N. program at Dalhousie University, using a questionaire similar to that used at the clinic.

RESULTS

On each of the five days in which the clinic was held, approximately 8 to 10 individuals came to be tested. As indicated in Table I the clinic attracted a total of 43 participants, of whom two were found to be carriers. This would suggest a carrier rate of 0.047 which is slightly higher than the rate found in previous screenings in Atlantic Canada[5]. Of the five indecisives, three were subsequently retested; two of these were normal.

TABLE I

RESULTS OF TAY-SACH'S DISEASE SCREENING PROGRAM

	Normal	Indecisive	Carrier	Total
Male	24	1	1	26
Female	12	4	1	17
TOTAL	36	5	2	43

A comparison of some characteristics of the group participating in the program with those who did not participate is shown in Table II. The participant group tended to be older and was more likely to be married. They were essentially exposed to the same sources of information as those who did not attend, although a sizeable number (22%) of the latter group indicated that they were not aware of the program (Table III). Individuals in the participating group had a greater immediate intention of parenthood (Table IV). There was a similar tendency in respect to marriage plans although these latter results were not statistically significant (Table V).

Other items investigated in the questionnaire were knowledge of Tay-Sachs disease and attitudes towards genetic screening. By means of a true-false test consisting of nine questions, the knowledge of participants of facts relative to TSD was compared with that of the non-participating group. The mean percentage of correct answers was 78% for the participants, and 49% for the non-participating group ($P<0.001$). When we looked at the sub-group in the non-participants who had not been previously tested, we found the mean percentage of correct answers fell to 30%. These results would suggest a statistical, albeit not a causal, association between compliance in a genetic screening program and the knowledge of the participants of the subject being investigated[10].

TABLE II

COMPARISON OF PARTICIPANT AND NON-PARTICIPANT GROUP

	Participant Group	Non-Participant Group	Significance
Sex:			
Male	26	13	*
Female	17	14	
Age:			
years Mean (SD)	24.5 (4.59)	20.9 (2.83)	$P < 0.005$
range	13 to 33	16 to 26	
Marital Status:			
single	29	25	
married	14	2	$P < 0.05$
other	0	0	
Occupation:			
Full-time student	27	22	*
non-student	16	5	
Previously Tested for TSD:			
YES	0	17	
NO	43	10	

*Differences between participant and control groups in these categories were not statistically significant.

TABLE III

EXPOSURE TO PUBLICITY REGARDING THE SCREENING PROGRAM*

	Participant Group	Non-participant Group
Literature received in the mail	71%	63%
Notice in Shalom magazine	21%	19%
Notice in university newspapers	23%	4%
Public TV, radio, newspapers	16%	11%
Posters in public places	16%	11%
Announcement by Rabbi	0%	7%
Referral by physician	0%	0%
Friends	28%	26%
Other	19%	7%
Did not know about program	0%	22%

*Percentage of the total group who learned something of the screening program from the sources listed. Individuals may have been informed by more than one source and, therefore, contribute to the informed percentage in more than one category.

TABLE IV

INTENTION TO HAVE CHILDREN WITHIN THE NEXT TWO YEARS*

	Participant Group	Non-Participant Group	Totals
Do intend	12	0	12
Do not intend or undecided	31	27	58
TOTALS	43	27	70

*The difference between the groups in numbers of persons intending to have children is significant ($P < 0.01$).

TABLE V

MARITAL PLANS OF THOSE NOT ALREADY MARRIED*

	Participant Group	Non-Participant Group	Totals
Individuals intending to marry within the next two years	6	1	7
Individuals not intending to marry in the next two years, or undecided	23	26	49
TOTALS	29	27	56

*The differences in marital plans between the groups is not significant ($0.05 > P < 0.10$).

One of the design components of this screening program was that it incorporated an element of case-finding on the part of practising physicians. Notwithstanding the request which was conveyed in *The Nova Scotia Medical Bulletin*, not a single individual in this study reported that he or she had received notice of the screening program through a physician.

DISCUSSION

In major urban communities with a substantial Jewish population, such as Toronto and Montreal, screening programs for carrier detection of TSD have focussed on high-school students[12] or on referred young adults[13]. In the Maritimes, the relatively small numbers of persons of Jewish descent (3,625 persons[14]) precludes a concentration of potential clients for a screening program in high-school classes and physicians' offices, and the numbers are reduced still further by a generalized screening program offered 5 years ago. There is a modest concentration of young Jewish adults living in the Halifax metro area because of university attendance.

The success of the screening program can be estimated from subject compliance and knowledge. Information available from the Atlantic Jewish Council and analyzed by ourselves suggested an approximate target population of 114 persons. This would make the rate of compliance 43 of 114 or 38%. The program was clearly able to attract those persons at greatest risk for having an affected child, i.e. young adults contemplating parenthood (Tabe II). Such a result would support the proposition that a married person, particularly a newly-wed planning a family, would better appreciate the necessity for immediate testing as compared with someone who is not married and/or does not intend to raise a family. The married sub-group within the participant population is predictably older and has, therefore, caused an upward shift in the mean age of the participant population (Table II). In general, this group has passed beyond the insecure years of adolescence and may be better able to accept the implications of the heterozygous state[11].

Because this group is part of a larger group that did not participate in the screening program of 1975, it seems possible that the passage of several years has brought them closer to marriage and parenthood and an increasing appreciation of the relevance of personal genetic knowledge. That this is a major determinant, and not merely a

consequence of service availability or knowledge, is supported by the observation that all ten of the non-tested non-participants failed to avail themselves of an explicit, personal invitation to attend a subsequent clinic, despite a near universal expression of interest on their part.

In terms of alternatives for future screening programs, we recognize that referral by primary care physicians of untested young Jewish persons contemplating marriage or family could ensure a more complete and efficient screening procedure than that reported here. Unfortunately, the rates of physician referral in this and other studies[11,13] are regrettably low. Until these rates improve, limited focussed screens in a university or other similar setting may be the practical alternative.

CONCLUSION

A low-keyed publicity campaign, coupled with a limited educational program and an open-hours clinic can attract a mature and knowledgeable group of participants to a TSD screening clinic. □

For further information concerning Tay-Sach's disease or to arrange for screening, please contact: Co-ordinator, Biochemical Genetics Clinic, Atlantic Research Centre for Mental Retardation, 5849 University Avenue, Halifax, Nova Scotia. B3H 4H7. Telephone: (902) 424-6491.

ACKNOWLEDGEMENTS

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References

1. Okada S, O'Brien J S. Tay-Sachs disease: Generalized absence of a beta-D-N-acetylhexosaminidase component. *Science* 1969; **165**:698-700.
2. O'Brien J S, Okada S, Chen A, Fillerup D L. Tay-Sachs disease: Detection of heterozygotes and homozygotes by serum hexosaminidase assay. *N Eng J Med* 1970; **283**:15-20.
3. O'Brien J S, Okada S, Fillerup, D L, *et. al.* Tay-Sachs disease: Prenatal Diagnosis. *Science* 1971; **172**:61-64.
4. Kaback M M, Nathan T J, Greenwald S. TSD: Heterozygote Screening and Prenatal Diagnosis — U.S. Experience and World Perspective. *Prog Clin Biol Res* 1977; **18**:13-36.
5. Lowden J A, Davidson J. Tay-Sachs Screening and Prevention: The Canadian Experience. *Prog Clin Biol Res* 1977; **18**:37-46.
6. Padeh B, Shacher S, Katznelsen M B-M, Navon R, Goldman B. Perspectives in Screening and Prevention of TSD in Israel. *Prog Clin Biol Res* 1977; **18**:47-53.
7. Evans P R. Tay-Sachs Screening in Britain. *Prog Clin Biol Res* 1977; **18**:55-59.
8. Jenkins T, Lane A B, Kromberg J G R, Nurse G T. Tay-Sachs Screening: Current Status in South Africa. *Prog Clin Biol Res* 1977; **18**:61-67.
9. Notice to Physicians. *N S Med Bull* 1980; **59**:139.
10. Beck E, Blaichman S, Scriver C R, Clow C L. Advocacy and Compliance in Genetic Screening. *N Eng J Med* 1974; **291**:1166-1170.
11. Clarke J T R. Screening for Carriers of TSD: Two Approaches. *Can Med Assoc J* 1978; **119**:549-550.
12. Clow C L, Scriver C R. Knowledge about and attitudes towards genetic screening among high-school students: The Tay-Sachs experience. *Pediatrics* 1977; **59**:86-91.
13. Lowden J A. Role of the Physician in Screening for Carriers of TSD. *Can Med Assoc J* 1978; **119**:575-578.
14. *Ethnic Groups* (Catalogue 92-723), 1971 Census. Ottawa: Statistics Canada.

Tuberculosis: Current Management

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Mortality from tuberculosis has been declining throughout this century. The initial modest decline was accelerated in the late 1940s by the advent of antituberculous chemotherapy. Current rates[1] for both mortality and for new and reactivated cases are low and continue to decline. (Figures 1 and 2) However, it is clear that tuberculosis will not disappear in the foreseeable future. A dwindling resource of expertise, which had been traditionally remote from the central stage of medicine, has been challenged in recent years to bridge the gap between the old sanatorium regimens and the current programs utilizing the general hospital and the ambulatory care setting under the supervision of the respirologist and the family physician. New drugs and new regimens are being actively explored, the duration of treatment has been reduced, and hospitalization now plays a monor role in the treatment program in most patients.[2]

FIGURE 1

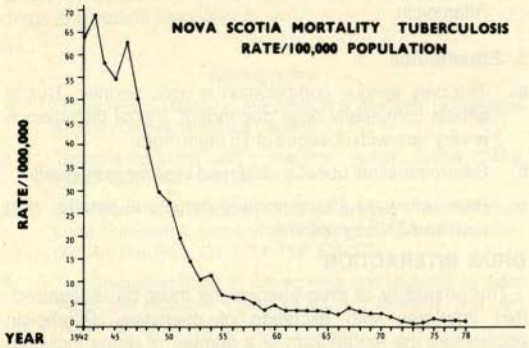
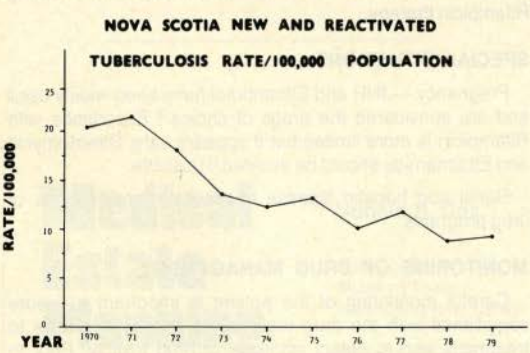


FIGURE 2



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THE SOURCE OF NEW CASES

Tuberculosis is an indolent disease which is only moderately infectious, with transmission almost invariably by inhalation of droplets of respiratory secretions. Conditions for infection require close contact with a patient exhibiting highly positive sputum, and conversion of the skin test is the hallmark of infection. Newly infected individuals may develop active desease within the first three to five years, or a focus may remain dormant for many years becoming active when host mechanisms are impaired for any reason. The high incidence of infection in the past has resulted in a large but aging reservoir of individuals with such dormant disease. The majority of new active cases stem from this aging but infected population with the result that tuberculosis has become in large measure a disease of older age.

PREVENTIVE THERAPY

Preventive chemotherapy is directed toward groups of individuals who are known to be at high risk of developing active disease. This includes those who are newly infected, those who have had close exposure to active cases and selected groups within the reservoir of previously infected persons. Candidates most frequently recommended for preventive therapy are detailed in Table I. More detailed recommendations are to be found in the American Thoracic Society publication[3] and in the analysis of Comstock and Edwards.[4] The only drug recommended for preventive therapy is INH (Isoniazid) in dosage of 300 mgs. daily for adult patients, continued for one year.

TABLE I

CANDIDATES FOR PREVENTIVE THERAPY

1. Tuberculin skin test converters.
2. Household contacts of persons with recently diagnosed tuberculosis.
3. Positive tuberculin skin test reactors: X-rays consistent with inactive tuberculosis.
4. Positive tuberculin skin test reactors; X-rays negative; below 35 years of age.
5. Positive tuberculin skin test reactors; special clinical situations, e.g. silicosis, immunosuppressed states; severe diabetes mellitus.

ACTIVE DISEASE

Criteria for active disease are:

1. Positive sputum culture. Such cases are always considered active regardless of other considerations.
2. Radiographic instability. Any change in x-ray findings, either an increase or decrease, indicates activity. Activity cannot be determined with certainty from a single radiographic examination. In particular, it is unwise to infer stability from the characteristics of a single x-ray.

3. Constitutional symptoms. When present such symptoms reinforce the presence of active disease. Symptoms are non-specific and therefore are not in themselves direct evidence of activity.

HOSPITALIZATION

Hospitalization of patients with active disease is recommended for purposes of assessment and initiation of treatment. Patients without constitutional symptoms require only a brief hospital stay. Those with positive sputum are generally considered to be rendered non-infectious after several weeks of adequate antituberculous therapy. In recent times an increasing incidence of organisms resistant to the usual antituberculous drugs suggests that caution should be exercised pending demonstration of the effectiveness of therapy. Those with constitutional symptoms should generally remain in hospital until all evidence of such symptoms has disappeared and the patient is clearly responding to therapy.

DRUG REGIMENS

The availability of new drugs has altered the recommended drug combinations. Rifampicin, a highly effective antituberculous drug, has relegated Streptomycin to a secondary position and Ethambutol has supplanted PAS as a secondary drug. The combination of INH and Rifampicin is highly effective and has permitted the duration of therapy to be reduced to twelve months. Current indications are that a further reduction to nine months may be justified by studies now in process. Standard regimens for adults at the present time are as follows:

1. INH 300 mgs. daily in a single dose.
2. Rifampicin 600 mgs. daily in a single dose, one-half hour a.c.
3. Ethambutol 15 mgs/kg heavy body weight in a single daily dose.

After three months, and provided that there is clear evidence of drug effectiveness (radiographic improvement, sputum conversion to negative and no constitutional symptoms), the Ethambutol is dropped from the regimen and the INH and Rifampicin are maintained for a further nine-month period.

Second-line drugs available if drug-resistant organisms emerge or if primary drugs are not tolerated, are Streptomycin and Pyrazinamide, with a tertiary position being allocated to Ethionamide, PAS, Cycloserine and Kanamycin.

CAUTION

Active disease must always be treated with multiple drugs. Treatment must be uninterrupted.

DRUG TOXICITY

Used judiciously and with appropriate monitoring, the incidence of drug toxicity is relatively low. A knowledge of the major toxic manifestations however is imperative.[5]

1. **INH**

a. Hypersensitivity and idiosyncratic manifestations. These include malaise, fever, chills and skin rash. More rarely, haematological reactions and vasculitis have been reported.

b. Peripheral neuropathy. This complication is most frequently observed in elderly patients and in those who abuse alcohol. Protection can be afforded by the addition of 50 to 100 mgs. of Pyridoxin daily.

c. Hepatic toxicity. This potentially serious side effect occurs most frequently during the early months of treatment although it may occur at any time. The incidence increases with age, with abuse of alcohol and with liver dysfunction. Subjects in the habit of daily use of alcohol are at higher risk. Clinical manifestations are similar to those of infectious hepatitis.

2. **Rifampicin.**

a. Hypersensitivity and idiosyncratic symptoms similar to those from INH with fever, malaise, chills and skin rash.

b. Gastrointestinal upset — usually not serious but important because of the difficulty of excluding hepatic toxicity.

c. Hepatic toxicity — a rare complication.

d. Occasional haematological and nervous system disturbances have been reported.

e. Orange discoloration of urine, saliva or tears is a frequent but unimportant observation in patients taking Rifampicin.

3. **Ethambutol**

a. The only serious complication is optic neuritis. This is almost completely dose dependent. Visual disturbance is very rare with dosages of 15 mgm/kgm.

b. Gastrointestinal upset is observed in some individuals.

c. Rare untoward effects include peripheral neuritis, skin rash and CNS symptoms.

DRUG INTERACTION

The possibility of drug interactions must be recognized. INH interferes with excretion of phenytoin. Rifampicin accelerates the metabolism of a number of drugs including anticoagulants, corticosteroids, digitoxin, and birth control pills. Women on oral contraceptives should be aware of the decreased effectiveness of this form of birth control during Rifampicin therapy.

SPECIAL SITUATIONS

Pregnancy — INH and Ethambutol have been widely used and are considered the drugs of choice.[2] Experience with Rifampicin is more limited but it appears safe. Streptomycin and Ethionamide should be avoided if possible.

Renal and hepatic disease necessitate modifications of drug programs.

MONITORING OF DRUG MANAGEMENT

Careful monitoring of the patient is important to insure compliance with the drug regimen, to assess response to treatment, and to detect evidence of drug toxicity. Prior to initiation of treatment a liver profile should be carried out. Patients should be examined at monthly intervals throughout their treatment and should be instructed to stop the drugs and report immediately, should symptoms of gastrointestinal upset, persistent general malaise, or visual disturbance occur.

In general it is probably not necessary to repeat evaluations of hepatic enzymes routinely. However, should any symptoms suggestive of hepatic toxicity occur, enzyme levels must be promptly determined. A threefold increase in transaminase levels under these circumstances is considered to be evidence for hepatic toxicity.

Sputum cultures should be obtained monthly until sputum conversion is achieved and thereafter at three-monthly intervals. X-rays should be performed monthly until improvement has been demonstrated. Thereafter, x-rays at two-to-three-monthly intervals suffice. Relapse following treatment generally occurs within the first three years. As a precaution radiographic and clinical evaluation at six monthly intervals during the first year and then annually for an additional two years is recommended.

TREATMENT FAILURES

Given an adequate multidrug regimen which includes both INH and Rifampicin and given compliance to therapy on the part of the patient, treatment failures are rare. An increasing incidence of drug resistant organisms is being reported particularly in the Oriental and Hispanic populations. Appropriate adjustment of the treatment program is imperative under these circumstances, taking into account the sensitivity studies, any previous treatment, available new drugs and patient compliance. □

Bibliography

1. *Tuberculosis Statistics. Morbidity and Mortality.* (Catalogue 82-212) Ottawa: Statistics Canada, 1979.
2. Tuberculosis in the 1980's. Glassroth, Robins, Snider. *N Eng J Med* 1980; **302:** 1441-50.
3. American Thoracic Society: Medical Section of the American Lung Association. Preventive Therapy of Tuberculous Infection. *Am Rev Resp Dis* 1974; **110:** 371-375.
4. The Competing Risks of Tuberculosis and Hepatitis for Adult Tuberculin Reactors. Comstock, G. W., Edwards, P.O. *Am Rev Resp Dis* 1975; **111:** 573-7.
5. The Pharmacological Basis of Therapeutics. Goodman and Gilman 6th Edition MacMillan Publishing Co. N.Y.

Ultrasound and X-ray in Clinical Obstetrics: AN UPDATE

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Approximately five years ago, certain conclusions and impressions regarding the relative roles of ultrasound and radiographic imaging during pregnancy were discussed in this *Bulletin.*[1] Since that time tremendous improvement in ultrasound equipment as well as extensive experience with this modality have indicated a need for re-assessment.

SAFETY

At present, two different forms of propagation of ultrasound waves are used clinically. One is the pulsed form where the equipment transmits the pulse of energy for about 1% of the time, and spends the remaining 99% of the time receiving echoes. The other is the continuous beam, which is used in Doppler techniques, which gives far greater levels of ultrasound energy per unit time. Our B-mode and real-time techniques employ the pulsed form.

Extensive ultrasound studies on human pregnancy have shown no evidence of harmful biological effect, and this has led some equipment manufactures and others to state that diagnostic ultrasound examinations are unequivocally safe. Unfortunately, ultrasound exposure has been shown to cause cellular and tissue damage to both animals and plants,[2] but not until ultrasound intensity levels greatly exceed the levels employed clinically. Cell lysis and death in mammalian tissue cultures begin at about 1000 mw./cm^2.[3] Diagnostic levels of ultrasound seldom exceed 50 mw./cm^2,[4] but it cannot be stated with absolute certainty that diagnostic ultrasound examinations are completely harmless to the developing embryo, since it has only been in widespread clinical use for about 15 years. What can be said is that thus far there has been no known instance of human injury that has been caused by the clinical use of diagnostic ultrasound in either form.

X-ray exposure of the fetus still carries the hazard of a small but definite increase in the incidence of childhood malignancies, as suggested by Stewart[5] over 20 years ago, and even though changes in equipment, films and screens have reduced this hazard significantly, it is still a factor when considering any radiographic examination during pregnancy.

GESTATIONAL AGE

When the usual method of assessing fetal age such as menstrual history, size and growth of the uterus and its contents and date of the onset of quickening are inconclusive, the physician usually requires further help in the assessment of this problem.

Ultrasound examination can be done very early in pregnancy when either the size of the gestational sac, or the measurement of crown rump length of the fetus will provide an estimate of fetal age within approximately seven days. It is possible to diagnose and date the gestation as early as three weeks from conception, but we feel that the ideal time for a base-line examination for dating of a pregnancy should be between 15 and 20 weeks gestation. At that time, the biparietal diameter (BPD) of the fetal skull will be reliable to within 10 days in 95% of normal cases; the location of the placenta can be determined; and the diagnosis or exclusion of multiple pregnancy can be made with almost 100% accuracy. (A survey of women who delivered twins and had ultrasound examinations at the Grace Maternity Hospital during 1979 and 1980[6] revealed that 71 of 72 were diagnosed on their initial ultrasound examination).

Major congenital malformations are also much more diagnosable at this time than earlier. The entire examination takes about 20 minutes in the usual case and is painless and well tolerated by the patient. Nearer term, because of slower growth of the biparietal diameter, there is a much wider normal variation and a single ultrasound study at this stage is much less accurate in the assessment of gestational age. Even so, as the biparietal diameter increases to 9.0 centimetres, the likelihood of the baby weighing at least 2500 grams approaches 100%. Unfortunately, changes in BPD alone will not enable the diagnosis of intrauterine growth retardation to be made in almost 50% of cases, so that additional measurements such as abdominal circumference and also total intrauterine volume are used. We have found abdominal circumference to be much more helpful than the uterine volume measurements, since the volume of amniotic fluid introduces quite a significant variable. With recent advances in technology and resolution of detail, it may soon be possible to obtain more informative studies of the placenta in this important condition.

Many radiographic measurements and methods have been used for the assessment of gestational age and these include various skull measurements, the length of the lumbar spine, the length of the femoral shaft, the presence of placental calcification, the presence of fetal fat, dental development and finally appearance of various ossification centers. Of all these radiological methods, the simplest and most reliable is the assessment of the time of appearance of the distal femoral centre and also the proximal tibial centre. As a rule the former centre appears at 36 weeks or later and the latter at 38 weeks or later. Schreiber *et al.*[7] found that antepartum visualization of the femoral centre indicated a mature fetus in 96% of cases. This, of course, also means that 4 percent of infants with visible femoral centers were not mature. When both centres were present the fetus was mature in 98% of cases. Conversely, the failure to visualize either of the knee centres, even with optimum detail, is of little help, since they may not be seen in as high as 20% of mature babies.

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Thus, fetal age determinations are best done by ultrasound examination and we feel the ideal time for this examination is between 15 and 20 weeks. This is a bit of compromise since the earlier the examination is performed, the more accurate the dating of the pregnancy although the early examination tells little else about the state of the fetus, amniotic fluid or placenta. If ultrasound facilites are not available then radiographic study for fetal age determination near term can be helpful although it has significant limitations.

PLACENTAL LOCALIZATION

The sophistication of ultrasound equipment during the last five years has enabled this modality to localize the placental site with a degree of accuracy that cannot be achieved by either plain radiographs or isotope scanning. The placenta is easily visualized by ultrasound even when it is low and on the posterior uterine wall. Other methods of placental localization are poor second choices and are not used locally.

A surprising observation first made by King[8] is that the placenta appears to change its position cephalad in a high proportion of pregnancies. In our experience it is not at all unusual to see a marginal placenta previa at 20 weeks "migrate" to a more superior uterine location on re-examination at 36 weeks, when it will be completely free of the cervix. Although this shift takes place in 9 out of 10 patients it is not possible to predict with certainty which will migrate, so we recommend that all patients who have placenta previa diagnosed during the second trimester be re-examined later. Fortunately, the "migration" is always away from the cervix and is presumably due to differential growth of the myometrium.

PELVIMETRY

Ultrasonic methods for measuring the bony pelvis have made no progress since the initial preliminary reports from Sweden approximately eight years ago.[9] X-ray examination is the only imaging method that is practical for pelvic assessment, and although the number of pelvimetries in the Metro area continues to decrease each year, last year 314 were performed at the Grace Maternity Hospital.

CURRENT PROBLEMS

Perhaps, the biggest question in this field is which patient should be examined by ultrasound. We see extremes locally, from the physician who routinely obtains ultrasound examinations on all his pregnant patients to those who practically never request an ultrasound examination. Our present policy is to suggest that any woman who has any evidence of abnormality during the pregnancy, or who is not sure of her dates should have an ultrasound examination. The next commonest problem is the question as to who should perform the examination, physician or technician. It is our policy for the physician to perform or directly supervise the examination on the initial visit of the patient to our ultrasound unit. A related problem in some areas is which physician should perform the examination. Radiologists feel that with their training in imaging and in ultrasound studies in other clinical situations it is logical that they should perform the ultrasound examinations, while some obstetricians feel that with their obstetric training they should be responsible.

Diagnostically, our inability to visualize a tubal pregnancy in most instances continues to be a basic problem. If however, a true gestational sac can be seen within the uterine cavity it renders this diagnosis extremely unlikely. This problem should soon be solved with improving technology. Already there are reports in the ultrasound literature of visualizations of the Graafian follicle and the use of this advance in the management of infertility.[10]

THE FUTURE

Unless some investigators indicate that there are significant hazards to the use of diagnostic ultrasound, the continuing sophistication of the equipment, and advances in neonatalogy and obstetrics will be such that it will be an unusual woman indeed who does not have an ultrasound examination during her pregnancy. □

References

1. Grantmyre Edward B. Ultrasound and X-Ray in Clinical Obstetrics. *N S Med Bull* 1975; **54:** 18.
2. Fry, F J. Biological effects of ultrasound: A review. IEEE 1979; **67:**604.
3. Kaufman G E, Milbe M W, Griffiths T D, et al. Lysis and viability of cultured mammalian cells exposed to 1 MHZ ultrasound. *Ultrasound Med Biol* 1977; **3:**21.
4. Carson P L, Fischella PR. Oughton, T.V.: Ultrasonic power & intensities produced by diagnostic ultrasound equipment. *Ultrasound Med Biol* 1978; **3:**341.
5. Stewart A M, Kneale G W. Radiation dose effects in relation to obstetric X-Rays and cancers. *Lancet* 1970; **i:** 1185.
6. Jarratt Mary. *The Inheritance of Twins.* Dalhousie Medical Student Elective, 1981.
7. Schrieber M H, et al. Epiphyseal ossification center visualization. *J A M A* 1963; **184:**504-507.
8. King D L. Placental migration demonstrated by ultrasonography. *Radiology* 1973; **109:**167.
9. Vaclevinkova V. A method of measuring the interspinous diameter by an ultrasound technique. *Acta Ob Gyn Scan* 1973; **52:**161.
10. Hackeloer B J, *et al.* Correlation of ultrasonic & endocrinological assessment of human follicular development. *Am J Obst Gynec 1979;* **135:**122.

Continuing Medical Education Through the Clinical Traineeship

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THE NEED FOR CLINICAL TRAINEESHIPS

Apprenticeships have been used as a traditional form of education for many professions and trades. In medicine, from Hippocratic times, the apprenticeship has provided the means of acquiring expertise in patient care, with the apprentice absorbing the knowledge, skills, and compassion of the teacher through practical example. Today, this type of clinical training occurs in the undergraduate clinical clerkship, internship and in residency training.

Just as the apprentice, once qualified, in addition to developing his own ideas and style, would discuss with his peers how new techniques could make his work easier, so today's graduate in medicine continues to incorporate new ideas into his practice. Through discussion with colleagues, consultations, reading journals, audio and video tape review, or through more structured methods such as community hospital programs, continuing medical education courses or conventions, most physicians try to maintain and build on their current knowledge. The accelerated pace of change in medicine through increasing research has led to a corresponding increase in the rate of introduction of new drugs, techniques and concepts.

This accelerated pace of change results in a widening gap between the acquisition of new knowledge of skills and their incorporation into practice. One study, by Williamson and his colleagues,[1] has shown that physicians given a C.M.E. program emphasising the need to order specific treatments when abnormal results were reported on certain diagnostic tests, failed to show any improvement in their pattern of ordering the required treatments. This result occurred even though a post-course test had shown that the physicians knew why such treatments should be ordered. Knowing what to do is apparently not enough, for one must acquire the habit of utilising that knowledge, and be comfortable in applying it in everyday practice.

Bridging the gap between knowledge and its daily utilisation may be helped by peer review and medical audit but an opportunity to acquire and practise new skills and to apply problem solving skills under the guidance of a knowledgeable teacher, is likely to be a more effective educational tool. It is, after all, the way we learned these skills initially in the apprenticeship of medical education.

FORMS OF CLINICAL TRAINEESHIP

The need for supervised training in continuing education has led to the development of a number of different types of programs: these include externships, mini-residencies, community exchange programs, fellowships and clinical traineeships.

The externship offers an opportunity to observe in-hospital or in-clinic teaching of undergraduate medical students, interns and residents, providing an experience similar to that of a non-credit student auditing a course. The mini-residency implies a greater degree of responsibility of implementing clinical care under supervision, with immediate feedback on performances. The community exchange program involves a senior resident or faculty teacher acting as a locum to maintain the physician's practice, facilitating his assuming the resident's responsiblities at the teaching centre. These experiences, refreshing though they may be for both trainee and teachers may not meet the needs of the trainees, since they must slot into an existing program or pattern of care. Fellowships are usually awarded by granting agencies, professional associations or pharmaceutical institutions, and are given to those who have designed a program for themselves that meets their own needs and yet fits the policies of the granting agency. Since they are self-designed, fellowships are more likely to meet the perceived needs of the learner than those types described above, but the actual learning experiences chosen may not be the most effective or efficient to meet those particular needs.

A well designed Clinical Traineeship not only attempts to ensure that the needs of the trainee are identified, but also ensures that appropriate experiences and teachers are selected to meet these needs.

THE DALHOUSIE UNIVERSITY CLINICAL TRAINEESHIP

A physician seeking a clinical traineeship at Dalhousie University is asked to apply to the Division of Continuing Medical Education. In the ideal model, a C.M.E. educator discusses the trainee's needs, either in a meeting with the trainee or over the phone, and develops these into a series of educational objectives. The relevant Faculty Department or Departments are contacted, and requested to appoint advisors. The C.M.E. educator then discusses the objectives with the advisors, and a consensus is reached on the minimum amount of time, the scope, type and location of activities needed to fulfill the objectives. These requirements will vary according to the frequency with which the clinical problems in question present, and also with the demands for access and teaching by other groups such as clinical clerks, interns, residents and other health professionals.

Faculty advisors are then asked to prepare reading lists that the trainee can obtain through the Regional Library Loan Service of the W.K. Kellogg Health Sciences Library, for home study prior to the traineeship.

On reporting for the clinical traineeship, the trainee meets with his advisors and the C.M.E. educator to review the objectives and confirm the program to acheive them in the allotted time. Any misconception between the trainee and his advisors can be identified and corrected at this meeting.

*Assistant Director, Division of Continuing Medical Education Dalhousie University, Halifax, N.S.

Clinical traineeships range in duration from two weeks to six months, the average being three weeks. At the end of the traineeship (and at the mid-point, if the traineeship is a long one) an evaluation meeting is held to review the extent to which the trainee feels his objectives have been acheived, and to document any additional needs that have been met. Other steps that could be taken by the trainee to improve learning and incorporation of learned material into practice are discussed at this meeting. After a period of two to three months, trainees are contacted and asked their opinion concerning the effectiveness of the clinical traineeship, and to identify changes they have introduced into their practices.

Reviewing the results of this evaluation process, former trainees have listed from 2-10 practice changes employing skills, knowledge or techniques learned in the traineeship. This indicates that the clinical traineeship is, at least, a more effective form of learning than the C.M.E. program cited by Williamson *et al.*

COST OF CLINICAL TRAINEESHIP

Clinical traineeships place demands on the time of the trainee, the faculty advisor and the Division of Continuing Medical Education. A fee is charged the trainee to provide honoraria for the teachers and to cover C.M.E. costs, but the major cost to the trainee is the loss of practice income and continuing practice overheads during the period of the traineeship. Depending on the nature and purpose of the traineeship, not only the tuition fees, but also travel, accommodation and maintenance costs may be tax-deductible under the recent interpretation bulletin from Revenue Canada (#IT357R. 21 May 1980).

Grants-in-aid of clinical traineeships may be obtained from a number of sources, and amounts under $500 are not taxable. The College of Family Practice, Merck Sharp and Dohme, Ltd. and Schering Ltd. provide physicians with awards, and New Brunswick physicians have their tuition paid through their C.M.E. contribution to the New Brunswick Medical Society. For specialists, grants-in-aids are available through the Area V Regional Advisory Committee of the Royal College.

BENEFITS OF A CLINICAL TRAINEESHIP

Since the clinical traineeship has arisen directly out of practice needs identified by the trainee, he will have the satisfaction of meeting those needs with improved competence and increased confidence. His earning power may be increased through the introduction of new procedures, and he may attract a new clientele or better serve his present patients. Former trainees are enthusiastic that, despite the cost, this is a worthwhile experience. Their evaluations lead to the conclusion that the clinical traineeship method leads to the introduction of new diagnostic techniques, and changes in management and prescribing patterns, as well as the incorporation of new knowledge to a much greater extent than in other more passive forms of learning.

HOW LONG DOES IT TAKE TO ARRANGE?

Working out objectives and discussion with faculty advisors to determine the optimum duration of the traineeship, is time consuming, and absences from practice require planning. Clinical privileges must be arranged through hospital administrators, and temporary licensure obtained for out-of-province physicians. This requires an absolute minimum of six weeks lead-time, with three months between inquiry and traineeship being preferable.

Initial enquiry concerning clinical traineeships should be directed to:

The Clinical Traineeship Coordinator
Division of Continuing Medical Education
10th Floor, Sir Charles Tupper Medical Building
Halifax, N.S. B3H 4H7
(902) 424-2061

SUMMARY

Clinical Traineeships are continuing medical education experiences lasting from two weeks to six months, individually designed to meet the education needs specific to the physician's own practice. Although costly in teacher and trainee time, they are an effective form of C.M.E., which leads to the incorporation of new techniques, procedures and habits into the physician's practice. □

An Appreciation

DR. ALAN MacD. LAWLEY

All Digby County was saddened to read last week of the sudden death of Dr. Alan MacD. Lawley of Digby. Oral tributes have been heard and tributes through our rural correspondents have been read which testify to the many friends Dr. Lawley had in our communities as well as in his professional sphere. One of the finest and most sincere of these tributes which came to us was uttered by an age 88 years lady who said "He saved my life." That same expression could be made and we are sure is being made by a great many people within this County and beyond. For literally, Dr. Lawley, in his capacity as a skilful surgeon, gave his life in the saving of lives.

From the standpoint of the medical profession, we fear our words are inadequate to properly pay tribute to Dr. Lawley for, without a doubt, he was considered a most capable and skilful surgeon. Digby was most fortunate in having his services in this capacity from 1969 to the time of his sudden death at the Lawley summer residence in Cape Breton. Even in 1969 Dr. Lawley was not a stranger in our midst, he having had a medical practice in Weymouth earlier.

Not only will Dr. Lawley be missed by his patients throughout Digby County but his loss is extremely felt also by the Digby General Hospital of which he was Chief of Staff. The hospital board and the entire medical and hospital staff mourns the untimely passing of Dr. Lawley. His place will be difficult to fill.

Colleagues, medical personnel, patients and friends will express their respects when a service in memory of Dr. Lawley will be held at Grace United Church on Saturday. Sincerest sympathy is extended to Dr. Lawley's widow, Jean and their family of three daughters and two sons. □

Reprinted from The Digby Courier, 8/20/81

NOTICE

Dr. G.H. Ross, Chairman of the Executive Committee, will present at the 1981 Annual Meeting of The Medical Society of Nova Scotia, on behalf of the Executive Committee the following proposed amendment to the Society By-Laws. The purpose of the amendment is to provide for membership on the Nominating Committee to be one member per Branch Society.

Delete Sections 12.3.1.1 and 12.3.1.2
Insert new Section 12.3.1.1

"Section 12.3.1.1 The Society shall at its Annual Meeting elect from its members a Nominating Committee for the ensuing year which shall be made up of one member from each Branch in the Society. The President of the Society if present, shall be the Chairman thereof. Each Branch in the Society is entitled to nominate from its members who are in good standing in the Society one member and an alternate to the Nominating Committee. These nominations shall be made in writing to the Executive Secretary six weeks prior to the date of the Annual Meeting of the Medical Society."

NEW MEMBERS

The physicians listed below have joined The Medical Society of Nova Scotia between June 1, 1981 and August 31, 1981. A most cordial welcome is extended by the Society.

Dr. A. W. Bairos*	U.S.A.
Dr. R. A. Barker	Halifax
Dr. D. G. Blagdon	Bridgewater
Dr. L. M. Buffett	Halifax
Dr. R. G. Bustin	Berwick
Dr. N. L. Chipman	Digby
Dr. W. M. Gorman	Yarmouth
Dr. R. D. Gupta	Dartmouth
Dr. A. D. Hussard	Halifax
Dr. P. T. C. Lee	Halifax
Dr. G. Mohiuddin	Barrington
Dr. A. Nanda	Dartmouth
Dr. N. J. Pinsky	Halifax
Dr. Saroj Ram	Kentville
Dr. J. B. Roberts*	U.S.A.
Dr. A. H. Shlossberg	Halifax
Dr. M.A. Smith	Halifax
Dr. M. F. Smith	New Glasgow
Dr. E. J. Taiani	Halifax

*Recent graduates of Dalhousie University.

Personal Interest Notes

RESEARCH GRANTS GALORE!

Medical Research at Dalhousie is flourishing, and a record number of grants have been approved. The Medical Research Council has awarded over three million dollars to the Dalhousie Medical Research Committee, which is chaired by **Dr. Howard Dickson.** In addition, Cancer Research has greatly expanded thanks largely to the fantastic impetus of the Terry Fox Foundation.

Among the projects listed:

Cardio-vascular Research — $945,000. — **Dr. G. A. Klassen** *et al.*

Urology — $516,000. — **Dr. S. Awad** *et al.* — bladder physiology.

Microbiology — $197,700. — **Dr. G. C. Johnson** *et al.* — control of cell division.

Biochemistry — $173,000. — **Dr. M. W. Gray** — study of mitochondria.

Biochemistry — $145,800. — **Dr. W. F. Doolittle** — control of gene expresion.

Physiology — $116,800. — **Dr. B. Issekutz** — exercise metabolism.

Microbiology — $115,000. — **Dr. H. S. Spencer Lee** — Interferon.

Biochemistry — $113,000. — **Dr. C. B. Lazier** — oestrogen action.

Anatomy — $90,000. — **Dr. D. W. Nance** — nervous feed back of gonads.

Physiology — $84,000. — **Dr. J. C. Szerb** — norandrenaline release.

Urology — $172,000. — **Dr. J. W. Downie** *et al.* — neurogeneic disorders.

Dr. Robert Chambers, the Carnegie and Rockefeller professor of biochemistry, head of Dalhousie Department of Biochemistry, has been granted up to one million dollars from the Terry Fox Special Iniatives Program which is designed to stimulate innovative cancer research activities in Canada. He proposes to study molecular mechanism of mutations produced by the chemicals that cause cancer.

The Heart Foundations granted over $600,000. for scientists in the Faculty of Medicine for research into heart disease.

Dr. M. Tan and Dr. A. Bonen have received $30,000. from the Canadian Diabetes Association to pursue their research.

Impetus of Research

With this tremendous investment in brains and finance, physicians and patients have high expectations for significant advances in many fields of medicine over the next decade.

Dr. Joan Crosby was recently honoured by a scholarship in her name which will be made available for a Dalhousie Medical Student showing qualities of exceptional dedication and compassion, high scholastic achievement and financial need. The award was a gift of grateful parents of many children who were her patients.

Honorary Life Memberships of the Izaak Walton Killam Hospital for Children have been presented to **Dr. Edwin F. Ross, Mrs. Isabel Piercey** and **Major General E. C. Plow.**

OBITUARIES

Dr. Luther B. MacKenzie, (101) of Bedford, N.S. died at the Victoria General Hospital on August 14, 1981. Born in West River, Pictou Co., he graduated with a B.A. from Dalhousie University in 1900, and received his M.D. degree from New York University in 1904. He practised in New York and, after a distinguished career, he spent his retirement years at his home on Shore Drive in Bedford, N.S. He received many accolades throughout his life, the most recent his being awarded an Honarary Doctor of Laws from Dalhousie University on his 100th birthday. He is survived by his daughter, a brother and four grandchildren.

Dr. Alan M. Lawley, (57), chief of staff at Digby General Hospital, died August 5, 1981 at his summer residence in Aberdeen, Inverness Co. Nova Scotia. Born in North Sydney, he graduated from Dalhousie Medical School in 1959 and did postgraduate work at Boston City Hospital and Camp Hill Hospital. He practised in Inverness until 1969 at which time he moved to Digby. He served overseas in the army during the Second World War. Surviving are his wife Jean, three daughters and two sons to whom we extend our deepest sympathy. □

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