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The following are Abstracts from most of the papers read at this Meeting. I am grateful to Dr David Apple, Jr., President of ASIA for providing them.

I am pleased to say that these Abstracts will be a regular annual feature and should prove to be of great interest to readers of PARAPLEGIA.

PHILLIP HARRIS
EDITOR

Non-Halo/Non-Surgical Management of C1-C2 Fractures. By W. BELL, P. R. MEYER, Jr. & D. EDELSTEIN. *Northwestern University, Chicago, Illinois 60611*

Thirty consecutive patients with fractures of the cervical spine at the level of C1-C2 admitted to the Spinal Injury Service, Midwest Regional Spinal Cord Injury Care System, Northwestern University in 1981 are reviewed. The mechanisms of injury were motor vehicle accidents (57 per cent), falls (27 per cent) and miscellaneous (16 per cent). Age range of the 30 patients (with 32 fractures) was 6-82 years of age; male 16/female 14. Of the 30 patients, 21 were managed by conservative non-surgical/non-halo regime. Two C1-C2 neurological patients on ventilators expired and eight patients because of age, medical condition or lack of co-operation had halo stabilisation.

Levels of Injury

Six injuries occurred at the occiput-C1, C1-C2 interval: one dislocation occiput at C1, four Jefferson fractures involving the ring of C1, one rotary subluxation C1-C2. Twenty-six fractures involved C2: three type II odontoid fractures, 14 type III, eight uni- or bilateral pedicle Hangman fractures of C2, and one C2-C3 subluxation. Neurological levels: 24 had no neurological lesion (80 per cent); four had a complete neurological lesion (13 per cent); two had a partial neurological lesion.

		C1-C2 Injuries		
C1	<hr/>			6
	Occiput-C1 Dislocation	1		
	Jefferson	4		
	Rotary Subluxation C1-C2	1		
C2	<hr/>			26
	Odontoid II	3		
	Odontoid III	14		
	Hangmans	8		
	C2-C3 Subluxation	1		
				32

Management

Of the 30 patients, 29 were admitted less than 72 hours after trauma. All patients had cervical traction. All fractures were evaluated by tomography, and the neural lesion by somatosensory evoked potential (SSEP). Of the 21 patients not requiring halo or surgical management, the average period of cervical traction immobilisation was 26 days prior to the application of a cervical orthosis (sternal-occipital-mandibular immobilisation) SOMI orthosis. Average hospital stay 28 days. Eighteen were considered to be healed fractures by cervical flexion/extension radiographs at three months; one non-union was identified at 12 months requiring C1-C2 posterior fusion. Average follow-up 15 months; no incident of neurological deterioration. Those with an incomplete neurological lesion had neurological improvement.

 Management

Traction & Orthosis	21
Halo	8
Deaths	2

 Criteria for halo

1. Absence of neurological dysfunction
 2. Unstable burst fractures
 3. Unstable post operative spine fusion
 4. Subluxation in patients with rheumatoid arthritis of the cervical spine
 5. Post operative fracture correction in patients with ankylosing spondylitis
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Inoperable Cervical Spine Fractures. By THOMAS G. SAUL, M.D., *Good Samaritan Hospital, Division of Neurosurgery, University of Cincinnati Medical Centre, Cincinnati, Ohio.*

The author indicates that the treatment of unstable cervical spine fractures should be individualised not only as to the decision of the type of stabilisation procedure to be performed, but also concerning the decision of whether to operate at all. When the spinal fracture does not lend itself to surgical stabilisation, rehabilitation is affected and the patient will require to forego the advantages of early mobilisation. Three patients with disruption of the anterior and posterior elements of the cervical spine were discussed. Each was treated with skeletal traction for 12 weeks; two of the fractures healed successfully with good alignment, but one remained unstable and posterior wiring and fusion was necessary. The author emphasised the necessity for the surgeon to be realistic about what can be accomplished with surgical intervention.

Combined Simultaneous Anterior-posterior Column-neural Decompression and Fusion for Fracture-dislocation of the Thoracic and Lumbar Spine. By D. EDELSTEIN, M.D., P. R. MEYER, JR., M.D., S. H. DAVNE, M.D. & VANECKO, M.D. *Northwestern Memorial Hospital, Chicago, Illinois.*

Fifty-six patients with fracture-dislocations of the thoracic and lumbar spine under-

went combined anterior-posterior spinal column decompression, and were evaluated. Thirty-nine had simultaneous approaches and 17 had staged operations. A lateral approach was utilised in both the thoracic and the lumbar areas. For the acute previously untreated patient the anterior and posterior areas were treated by two surgical teams using the lateral approach. The indications were evidence of incomplete neurological injury to the spinal cord, conus medullaris or cauda equina; burst fracture of a vertebral body with bone or disc obstruction of the anterior aspect of the neural canal; spinal canal obstruction at the level of injury, demonstrated by myelography progressive kyphosis with spinal cord compression secondary to anterior element collapse, or in the patients with a complete neurological lesion if there is complete vertebral body dislocation and spinal mal-alignment. Late staged anterior decompression is advised for the patient who has undergone only posterior surgery without neural decompression. Forty-three of the patients had incomplete neural lesions. Twenty-nine improved at least two Frankel grades post-operatively. All the spines became fused. There were no infections and no deaths. Two developed post-operative kyphosis and two required re-operation because of failure of Harrington rod fixation. The follow-up was from 1 to 7 years.

Compression-distraction Instrumentation of Thoracolumbar Fractures.

By JAMES S. KEENE, M.D., D. L. WACKWITZ, M.D., D. S. DRUMMOND, M.D. & A. L. BREED, M.D. *University of Wisconsin, Madison, Wisconsin, U.S.A.*

Fifty-five patients with fractures, dislocations, or fracture-dislocations of the thoracolumbar spine were evaluated for the quality of reduction achieved following bilateral distraction (23 patients), bilateral compression (20 patients), or distraction and compression instrumentation (12 patients). The pre- and post-operative anterior-posterior and lateral radiographs of all patients were randomised and examined independently by each author to determine: (1) the type of fracture; (2) vertebral body compression; (3) angular deformity; and (4) the degree of displacement. We found that: (1) distraction combined with compression instrumentation produced the best correction in flexion-distraction fractures; (3) two or more laminectomies compromised reduction; and (4) the poorest reductions (regardless of instrumentation) were obtained in flexion-axial compression (burst) fractures, and fractures treated with the instruments more than 6 weeks after the occurrence of injury.

Problems in the Harrington Instrumentation of Patients with Paraplegia from a Spinal Fracture.

By H. H. MURRAY, M.D., A. McDONALD, M.D., ROGOZINSKI, M.D. & D. F. APPLE, Jr., M.D. *Shepherd Spinal Center, Atlanta, Georgia.*

One hundred and three consecutive cases of Harrington Rod instrumentation were reviewed to delineate problems and complications. The problems were divided into those occurring during operation, those occurring in the early post-operative period, and those occurring late after discharge.

The most common operative problem identified was fixation of inadequate number of vertebrae above and below injury. The next most common was improper hook placement associated with laminal fracture. Both of these problems were related to loss of fixation with recurrence of deformity. There was one intra-operative death associated with a pulmonary embolus proven at autopsy. Early post-operative problems included loss of fixation related to hook displacement, or failure to place ring clamps or wires below the upper hooks. Thrombophlebitis occurred in 60 per cent of the patients who had complete neurological lesions.

Late problems are less common but consisted of pain related to loose hooks or rods and lower extremity dysaesthesia. The review demonstrated the difficulties encountered in operative reduction and fixation of the fractured spine in the paraplegic patient. The necessity for careful pre-operative planning and the adherence to using proper Harrington Rod surgical technique is stressed. The fixation problems in 24 per cent of the group appeared to be related to deviations from recommended techniques: most commonly due to the inadequate length of instrumentation and improper hook placement.

Incidence of Selected Medical Complications Among Spinal Cord Injured Patients Treated in an Ideal System Compared with those Treated in a Non-system. By W. H. DONOVAN, M.D., SIR GEORGE BEDBROOK, F.R.C.S., J. S. YOUNG, M.D., G. L. CLIFTON, M.D., R. E. CARTER, M.D. & E. R. GRIFFITHS, F.R.C.S. *The Institute for Rehabilitation and Research, Houston, Texas.*

Data from a 'perfect system' of spinal cord care in Western Australia were compared with data from patients outside of any system of care in the United States in several important categories. The data indicated that bacteriuria and selected respirator complications are encountered in the best of circumstances. Pressure ulcers of the skin, and gastrointestinal ulcers are preventable complications. The incidence of all complications in non-system care rose as the time from the date of injury progressed but was more prevalent in skin and urinary tract complications. The data suggested that system care is preferable in preventing complications, and the sooner a patient becomes a part of a total care system the less likely is it that complications will ensue.

Motor and Sensory Recovery Following Spinal Cord Injury. By M. L. GOLDBERG, Ph.D., K. J. KLOSE, Ph.D., B. A. GREEN, M.D., F. EISMONT, M.D. & J. O'HEIR. *University of Miami School of Medicine, Miami, Florida.*

Functional neurological recovery following spinal cord injury was analysed using the Miami Neuro-Spinal Index, dividing the 107 patients with injuries into the following groups: (1) incomplete-closed; (2) incomplete-open; (3) complete-closed; (4) complete-open. The result of analyses indicated that the amount of recovery in both motor and sensory function varies significantly in relation to the degree of the neurological lesion. Incomplete-closed injuries were associated with the greatest degree of recovery in both motor and sensory function, whilst complete-open injuries demonstrated the least return. Complete-closed injuries demonstrated little motor change whilst sensory function improved in each successive post-injury measurement period following one week.

Standing by Functional Electrical Stimulation in Paraplegia. By A. KRALJ, D.Sc.¹ & R. JAEGER, Ph.D.² ¹*Edward Kardelj University, Ljubljana, Yugoslavia,* ²*Illinois Institute of Medical Engineering, Chicago, Illinois, U.S.A.*

Functional electrical stimulation (FES) for standing was introduced in 1960 by Kantrowitz but has not been accepted for spinal cord injury patients because of medical and technological problems. The authors selected surface stimulation for evaluation of FES enabled standing in patients with T₄-T₁₂ lesions having upper motor neuron paralysis in the major muscle groups in the lower extremities. For standing, bilateral quadriceps stimulation was used with water soaked electrodes

secured with straps. Hands were used for balancing with the hips locked in hyperextension. Results with 23 patients indicated that patients readily adapted to FES, and could stand for periods of 5 to 30 minutes. Postural stability once standing is less than it is with conventional bracing, because the ankles are not stabilised. The authors concluded that FES may be feasible as an alternative to bracing in some individuals and that it be considered as a new technique enabling limited functional usable standing. Improved skin condition and arrest of lower extremity atrophy was also noted.

Spinal Cord Injury: A Sensory Restriction Perspective. By J. S. RICHARDS, Ph.D., M. HIRT, Ph.D. & L. MELAMED. *University of Alabama, Birmingham, Alabama, U.S.A.*

A review of the sensory deprivation literature since World War II led the authors to infer that spinal cord injury (SCI) might be expected to affect cognitive functioning. Spinal cord injured individuals and able-bodied controls were tested using a barely audible 1000 hz tone presented at unpredictable intervals through earphones.

Results indicated that spinal cord injured patients did not suffer significant cortical arousal or performance deficits under the study conditions. It was concluded that under more normal environmental sensory conditions SCI patients are not likely to suffer significant cortical arousal or performance deficits as a secondary result of their injuries.

Transient Psychosis in Acute Spinal Cord Injury Patients. By B. WOODBURY, Ph.D. & J. DITUNNO, Jr., M.D. *Thomas Jefferson Hospital, Philadelphia, Pennsylvania, U.S.A.*

Fifty consecutive patients were observed daily from admission for verbalised hallucinations and/or delusions. Eight patients (16 per cent) manifested psychotic behaviour by these criteria, a higher rate than suspected or previously reported. Further study of 220 consecutive SCI admissions yielded a similar rate of occurrence (16 per cent, N = 35). Fourteen per cent of these had a previous psychiatric history but 45 per cent have been abusers of drugs or alcohol. Seventy-three per cent of these transient psychoses occurred in the first week with 68 per cent lasting less than one day. Only 23 per cent were on mechanical respiratory support and only 23 per cent were febrile. Medications being utilised by this group of patients were cimetadine (89 per cent), steroids (84 per cent), pain medications (42 per cent), muscle relaxants (37 per cent), and sedatives (21 per cent). Only 16 per cent of these patients were not receiving psychoactive drugs other than cimetadine and steroids with no patient being drug free.

Clean Intermittent Catheterizations as the Initial Management for Spinal Cord Injured Patients. By F. MAYNARD, Jr., M.D. & C. DIOKNO, M.D. *University of Michigan Medical Center, Ann Arbor, Michigan, U.S.A.*

Fifty traumatic spinal cord injured patients less than 3 months post injury were involved in a prospective clean intermittent catheterization (CIC) programme. Initial evaluation included urinalysis, urine culture, IVP, cystometrogram and EMG, cystoscopy and serum creatinin. Any bacteriuria was treated appropriately. Patients were randomly assigned to groups receiving or not receiving TMP/SMA or Macrodantin. These groups were further divided into

those who were promptly treated with the antibiotic of choice for 10 days for a laboratory infection or those which were treated only if a clinical infection (fever 100°F) were treated.

Conclusions were: that the technique of CIC used for initial bladder management is not associated with a high rate of urinary complications; that CIC is associated with high rates of bacteriuria but not clinical infections; that prophylactic antibiotics during CIC reduced the probability of bacteriuria but may not reduce clinical infections; that prompt treatment of asymptomatic bacteriuria may not be routinely indicated; and that further study of patients on long term CIC is needed.

Use of the Artificial Urinary Sphincter to Achieve Continence in Patients with a Spinal Cord Injury. By J. K. LIGHT, M.D. *The Institute of Rehabilitation and Research, Houston, Texas, U.S.A.*

Forty-nine patients with spinal cord injury who had undergone implantation of the artificial urinary sphincter to achieve continence were reviewed. Follow-up was from 3–16 months. Most of the patients had been tried initially on intermittent catheterization with pharmacology without success. There were 42 male and seven female patients. At the time of the evaluation for the artificial urinary sphincter, 25 patients were using an external catheter, seven had indwelling Foley catheters and seven were still on intermittent catheterization. The remainder used diapers or the Crede manoeuvre. Urodynamic evaluation enabled the bladder to be divided into three types—hyperreflexia, areflexia and low compliance. There were 20 patients in the hyperreflexia group, four of whom had the device removed because of infection. Of the remaining 16, 12 were continent. The reason for failure of the remaining four patients was persistent hyperreflexia. This was managed in two patients with a sacral rhizotomy in one and an augmentation cystoplasty in one resulting in total continence. Of the hyperreflexic group therefore, a total of 14 patients attained urinary continence. There were 20 patients with detrusor areflexia and high compliance of which 17 were continent. The three failures all had the cuff placed around bulbar urethra and this emphasizes that the bladder neck is still the best site for placement of the cuff. Of the high incidence of failure was associated with detrusor fibrosis. The incidence of success in attaining total urinary incontinence in the hyperreflexic group was 70 per cent, the areflexia with high compliance 90 per cent and the low compliance 50 per cent to give an overall success rate of 70 per cent. Twenty-six patients required 37 procedures to correct device malfunction which restored continence. The incidence of infection was 24 per cent which is high. All patients, however, had significant asymptomatic bacteriuria for a variable period prior to the surgery to insert the artificial sphincter. It is essential therefore, that patients maintain sterile urine in the early phase following their injury if there is a possibility that they will become candidates for the artificial urinary sphincter. The presence of a fibrotic bladder is a contraindication to this type of surgery unless this is corrected pre-operatively.

Prediction of Urinary Tract Complications in Spinal Cord Injury Patients: Follow-up Studies. By L. K. LLOYD, M.D., K. V. KUHLEMEIER, Ph.D., P.R. FINE, Ph.D., A. B. MCEACHRAN & S. L. STOVER, M.D. *University of Alabama, Birmingham, Alabama, U.S.A.*

Alterations in the upper urinary tract on excretory urography have been the commonest sign used for determining the need for clinical evaluation and intervention in the asymptomatic spinal injured patient. We have assessed multiple variables obtained at the time of routine annual evaluation to determine if any are significantly associated with the development of pyelocaliectasis on the IVP. Two

hundred and seventeen patients were evaluated. Two hundred and six had no significant change in pyelocaliectasis and 11 patients showed significant abnormalities. Of 16 variables examined, four were statistically significant in their association with the development of pyelocaliectasis. In order of decreasing importance they were, presence of kidney stones at any year, presence of bladder diverticula in year one, change in effective renal plasma flow, and vesicoureteral reflux in year one. Using an empiric dividing point in the discriminant function scores of patients who did and did not develop pyelocaliectasis, 88 per cent of the patients who did not develop pyelocaliectasis were correctly identified and 67 per cent of those who showed a change in pyelocaliectasis. Bladder diverticula and vesicoureteral reflux are indicators of imbalanced vesicourethral function which would be expected to require therapeutic intervention. The study further underscores the potential seriousness of renal calculi and the effectiveness of the comprehensive renal scintillation procedure as a screening examination.

The Risk of Bladder Calculi in Spinal Cord Injury Patients. By M. J. DEVIVO, M.P.H., P. R. FINA, Ph.D., G. R. CUTTER, Ph.D., H. M. MAETZ, V.M.D. & S. L. STOVER, M.D. *University of Alabama, Birmingham, Alabama, U.S.A.*

Five hundred patients were evaluated regarding the risk of bladder calculi by analyzing the following factors: age at injury, sex, race, neurological level, extent of lesion, method of bladder drainage, specific organisms infecting the urinary tract, urine pH, residual urine volume, blood urea nitrogen and serum calcium levels. Spinal cord injury patients who developed calculi before discharge were more likely to be young white males neurologically complete with Klebsiella infections. Post discharge, the young whites with indwelling urethral catheters infected with multiple organisms were most likely to have calculi. Serum calcium, urine pH, BUN, residual urine volumes and effective renal plasma flow were not significant. Bladder calculi were most likely to develop 2-3 months post injury. Sixty-four per cent of patients had never had a stone within 8 years of injury. When the predischarge predictive model was applied to the 500 patients a 73% sample could be correctly classified, while the post-discharge model was 72% accurate. Prospectively, the models achieved an overall accuracy rate of 75% predischarge and 79% post discharge. It was felt that high risk patients could be identified but not sufficiently so as to warrant intervention with acetohydroxamic acid. But a close monitoring of these high risk patients would be feasible while increasing their fluid intake, administering prophylactic antimicrobial agents and routine bladder wash out procedures.

Dermatological Complications of Spinal Cord Injury. By K. C. PARSONS, M.D. & M. A. STAWISKI, M.D. *Spalding Medical Center, Denver, Colorado, U.S.A.*

Of 162 patients admitted for initial rehabilitation care, 29 per cent required dermatology consultations whereas only 5 per cent of re-admissions required a dermatology consultation. The common problems seen were steroid acne (25 patients), seborrheic dermatitis (14 patients), and intertrigo (11 patients). Other diagnoses were eczema (8 patients), Tinea versicolor (3 patients), and Herpes (4 patients). Recognised treatment regimens were effective in all patients except for the four with Herpes and the two patients with seborrhoea.

Pressure Sores: Factors Influencing Care. By D. F. APPLE, Jr., M.D. & H. H. MURRAY, M.D. *Shepherd Spinal Center, Atlanta, Georgia, U.S.A.*

One hundred patients with pressure sores were seen between 1976 and 1982 with

all but seven requiring surgery. Evaluation of this group demonstrated that patients with a poor nutritional state as indicated by low protein haemoglobin levels had a 920 day increased length of stay. Use of the turning frame to manage the patients' position and spasticity did not shorten the stay of those with trochanteric or multiple sores. The type of organism cultured from the sore and the length of time that the ulcer was present did not affect the length of stay. Ischial sores took the least time to heal with trochanteric sores requiring the longest stay, unless there were multiple sores which invariably increased the length of stay. One hundred and fifty-two procedures were performed with 72 patients having a debridement and closure as one stage. There were eight complications: three patients with blood clots and five with flap edge breakdown requiring debridement re-elevation and suture. Fifteen patients had recurrences at the same site and seven developed sores at different sites. The authors recommended that the patient be put into a good nutritional state, have a debridement and closure as one stage where possible and that flap closure be over a suction irrigation system left in place for ten days. The patient should probably be managed on a turning frame.

Salvage Procedures for Recurrent Pressure Sores. By J. G. KENNEY, M.D., M. T. EDGERTON, M.D. & R. F. EDLICH, M.D., Ph.D. *University of Virginia School of Medicine, Charlottesville, Virginia, U.S.A.*

Twenty patients with recurrent pressure ulcers are presented. Surgery was performed when the patient was immuno competent, had a positive nitrogen balance, had a wound bacterial count below 10^6 bacteria/gm tissue and had no evidence of severe spasticity. Ten patients with recurrent ischial ulcers covered initially with either a gracilis or tensor fascia lata myocutaneous flap were reconstructed with either an inferior gluteal myocutaneous flap, hamstring V-Y advancement flap or a vastus lateralis flap. Five patients with recurrent trochanteric pressure sores were covered with a biceps femoris or vastus lateralis myocutaneous flap. Five patients with recurrent sacral ulcers had reconstructive operations by a gluteus maximus, or tensor fascia lata myocutaneous flap; or by posterior thigh flaps. Following closure, the patients were placed supine on an air fluidised support system. All flaps were successful.

Tendon Surgery to Restore Useful Upper Limb Function Following Cervical Spinal Cord Injury. By A. A. FREEHAFFER, M.D., C. M. KELLY, M.D. & P. H. PECKHAM, M.D. *Cleveland Metropolitan General Hospital/ Highland View Hospital, Cleveland, Ohio, U.S.A.*

Seventy-two patients with cervical spinal cord injury underwent 103 tenodesis and tendon transfers over a 22-year period. Sixty-six patients had complete paralysis and only four had incomplete lesions. Patients were evaluated using the following criteria: activities of daily living, satisfaction of patients and physician, manual testing of muscle strength, measured force of grasp and elbow extension. Grading results in tetraplegic patients as excellent, good, fair and poor does not apply. The comparison of what is achieved with what was present pre-operatively is the best evaluation. The goal is to improve the neurological level. Evaluation revealed that many of the patients functioned better educationally, vocationally, recreationally, and socially. Provision of elbow extension improving finger grasp and thumb pinch were effective in improving neurological level. Tendon surgery should be considered one year following surgery if the neurological examination is stable.

Two-Stage Upper Extremity Reconstruction in the Tetraplegic Patient.

By C. HAMLIN, M.D., R. W. LIPKE, M.D. & R. L. HORNER, M.D. *Craig Hospital, Denver, Colorado, U.S.A.*

Upper extremity reconstructive surgery was performed on 50 patients over a four-year period. Twenty-three had a two-stage reconstruction. The first stage included an extrinsic digital and thumb extensor tenodesis providing an opening pattern with wrist flexion. Also included were either a free tendon graft around the index and ring metacarpal necks to the radial lateral bands of Zancolli's lasso procedure using superficialis tendons to prevent clawing during grasp. Stage two followed 4 weeks in a cast and 2 weeks of therapy and included use of the extensor carpi radialis longus, the pronator teres, and the brachioradialis as motors to achieve grasp and thumb flexion and rotation. The 23 patients were subjectively pleased with the results after 18 months to 4 years follow-up. Pinch of 5 pounds and grasp of better than 20 pounds can be expected. Some variation in surgical procedure occurs depending on the availability and strength of motors as well as the presence of joint stability or contracture. A small number of revisions must be anticipated. Conclusions were that the three to four month period of dependence is not easily accepted; individual achievement with newly gained pinch and grasp are extremely variable and hard to correlate; the procedures in a properly selected and well motivated population have durability and merit.

Posterior Deltoid to Triceps Transfer: A Review of the Experience at Rancho Los Amigos Hospital.

By R. C. RACZKA, M.D. & R. BRAUN, M.D. *Rancho Los Amigos Hospital, Downey, California, U.S.A.*

Eighteen C5-6 tetraplegic patients who had had 19 Moberg posterior deltoid to triceps transfers were reviewed with an average follow-up of 4 years and 1 month. Subjectively, 15 patients felt they had obtained a functional improvement and gained an increase in their level of independence. Increased stability of the arm was the most common benefit. Also noted were improvements in grooming, hygiene, writing speed, driving ability, wheelchair use, catheterization ability and ability to relieve ischial pressure. Objective assessment demonstrated an increase from 0+ to 2+ pre-operatively to a 3+ to 4+ grade post-operatively in 13 extremities. Acute and passive range of motion was maintained in all patients. Complications were failure of the tendon graft in midsubstance, deep wound infection and heterotopic ossification.

Post-Traumatic Cysts: Review of Post-Operative Functional Outcomes.

By S. J. GARRISON, M.D., W. H. DONOVAN, M.D. *The Institute for Rehabilitation and Research, Houston, Texas, U.S.A.*

Six cases of post-traumatic cysts, all males, were reviewed. Tetraplegic and paraplegic patients were equally affected. All patients underwent myelotomy with cyst drainage. Four showed ultimate recovery to the level of function prior to the onset of cyst symptoms, despite transient loss of motor function in the immediate post-operative period. Important factors concerning the suspicion of post-traumatic cysts are complaints of pain, loss of sensation, reflex or motor function above the level of the initial injury in a previously neurologically stable patient. If symptoms are progressive a thorough evaluation should proceed so that early identification and decompression may be accomplished. Although results were variable, immediate post-operative worsening does not indicate surgical failure as recovery of function may follow transient post-operative loss.

Cardiovascular Risk Factors and Spinal Cord Injury: Serum Magnesium and Lipoprotein Cholesterol. By G. BRENES, M.D., R. LAPORTE, Ph.D., R. SHAPER & P. LANDAU. *Harmarville Rehabilitation Center, Pittsburgh, Pennsylvania, U.S.A.*

Three factors, lipoprotein cholesterol, serum magnesium and serum calcium levels in 56 male and 10 female spinal cord injured patients were compared with values in an able bodied population. The magnesium and calcium levels were similar but the levels of high density lipo-protein (HDL) were very low, 34.8 mg/dl vs 46 mg/dl in the age matched male controls. In the females the values were 40.9 mg/dl vs 52.5 mg/dl. This would predicate over a 60 per cent increased risk for cardiovascular disease. Eight males studied 4 weeks after injury had values under 27 mg/dl. After a year these levels averaged 37 mg/dl. It was postulated that the reduced level of physical activity might account for the low HDL levels, possibly causing an increased coronary disease risk.

Functional Outcome and Mortality in Spinal Cord Injury Secondary to Malignancy. By PATRICK K. MURRAY, M.D. *University of Rochester, Rochester, New York, U.S.A.*

Twenty-seven patients, nine with complete and 18 were incomplete spinal neural lesions due to malignancy were studied. Functional status at discharge and at 3 and 12 months post discharge were reviewed with respect to independence regarding transfers and self care abilities. Of the nine patients with complete lesions none became independent during hospitalisation and at one year only one was entirely independent, two were dependent in mobility and ADL and six had died. Of the 18 patients with incomplete lesions 13 were independent in ADL and/or mobility at discharge, ten remained independent one year later, two were dependent and six had died. The study indicated a poor prognosis for those with a complete spinal malignant lesion. Those with incomplete lesions had a better prognosis and required long-term medication; thus their general health was better; and those with a spinal lesion secondary to radiation did better than those resulting from a tumour *per se*.