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EXPERIMENTAL TOURNIQUET ISCHAEMIA

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The effect of experimental tourniquet ischaemia (1 to 3 hours) on the circulation, muscle oxygen tension and fine structure of striated muscle of rabbit hind limb was studied.

Muscle blood flow was investigated using the ^{133}Xe clearance method. The results obtained suggest that even when the tourniquet time is extended to 3 hours, no blood flow occurs in the limb distal to the tourniquet when the cuff is inflated to 300 mmHg. A hyperaemic reaction followed release of the tourniquet and the magnitude of reactive hyperaemia was independent of the length of the tourniquet time. The hyperaemia was regularly of short duration and peak flow values were reached in 1 minute, with the flow returning to normal or subnormal values after 5 minutes.

Tissue oxygen tonometry with implanted silastic tubes was employed to register the effect of tourniquet blockade on the muscle PO_2. The muscle microclimate never reached fully anoxic conditions. The rapid response of muscle PO_2 to oxygen breathing suggests expedient recovery of tissue oxygenation after tourniquet occlusion.

Ultrastructural changes were noticed primarily in the energy-producing organelles. Ischaemia (extended up to 3 hours) caused only reversible, sublethal damage to the muscle cells.

HISTOQUANTITATIVE ANALYSIS OF BONE TISSUE

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In many diseases of bone there is reason to subject the areas of resorption and bone formation to histoquantitative analysis by examination of microtome sections which are not demineralized. A useful aid in these studies is the test field for calculating points and intersections of the surface with the test line, as developed by Merz (*Mikroskopie* **22:** 132, 1968). This makes it possible to quantify the different structures and to assess the intensity of bone resorption and formation.

Schenk's method is applied to pieces of bone stained with fuchsin and embedded in methacrylate. Sections are ground from the block for fluorescence and microradiographic examinations. After the end of the block has been moulded, microtome sections are obtained for the investigations mentioned above (10 µm) and for Goldner, van Kossa and modified Movat staining (5 µm).

Cells, osteoid and mineralized bone are clearly distinguished in Goldner staining. Using modified Movat staining, the different fractions are so clearly distinguished that the specimens can be used for computer-assisted image analysis, in addition to ordinary analysis performed using the test field. Matrix and mineralized bone are properly identified with van Kossa's staining. More quantitative results are required in basic research on bone and in clinical investigations. Subjective evaluation can be replaced by the use of measurable quantities.

EXPERIENCE WITH THE TREATMENT OF PERTHES' DISEASE

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The management of Perthes' disease at the Orthopaedic Hospital of the Invalid Foundation was by conservative means until 1969. These methods achieved a good result in about 50 per cent of cases (Edgren: *Acta orthop. scand.*, Suppl. 84, 1965).

In this study the results were related to Catterall's groups. During the period 1969–1974, 52 patients were treated conservatively and 66

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patients were treated using intertrochanteric varus osteotomy. Seventeen cases in group I were treated conservatively; the results were good in all of them. Eleven belonged to group IV, and in only one of them was the result assessed as good after treatment. On the other hand, 30 of the patients treated using intertrochanteric osteotomy were in group IV; the results in 8 of them were assessed as good after treatment. Some patients dropped into a lower group during the course of the disease. The following accessory operations were performed: two Chiari pelvic osteotomies, one shelf operation, one partial resection of the caput, and one epiphyseodesis of the contralateral femur.

POSTERIOR DISLOCATION AND POSTERIOR FRACTURE-DISLOCATION OF THE SHOULDER

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Posterior dislocation (PD) and posterior fracture-dislocation (PFD) of the shoulder are rare injuries but should not be missed at the first examination. Both types of joint derangement may result from trauma or convulsive seizure. The diagnosis may be made when the shoulder locks in adduction and internal rotation. The most important single reason for missing the diagnosis is taking only an A–P X-ray. An axillary roentgenogram is essential. Three patients (32 to 69 years of age) had delayed diagnosis and treatment: one bilateral PFD due to an electric shock, one bilateral PD occurring during a convulsive seizure, and one PFD during an epileptic attack. The treatment was given from 3 months to 2 years after injury. The fractures healed uneventfully. In one of the bilateral cases one side was operated on with a temporary Kirschner wire fixation. The results in both cases were good. The other dislocations were treated with physiotherapy with fair results. A recent dislocation should be treated with closed reduction. Failure to make an early diagnosis may necessitate operative intervention. Late operative treatment can give reasonably good results.

RECOVERY AFTER PRIMARY DISLOCATION OF THE SHOULDER

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A total of 227 out of 239 primary shoulder dislocations, treated at the Emergency Department and the Physiotherapy Department during the years 1973–1976, were followed up for 1 year.

The patients were divided into three treatment groups with 44 and 54 patients under 50 years of age in the first and second groups, respectively. In the first group, the affected shoulder was immobilized with a mitella for 1 week, while in the second group the affected upper extremity was maintained at the patient's side for 3 weeks. The third group comprised 130 patients over 50 years of age; they were treated in the same way as the patients in the first group.

Redislocation occurred in 30 cases within 1 year. It was significantly more frequent ($P < 0.01$) in the first and second groups than in the third group. The duration of immobilization had no effect on the frequency of redislocation. Normal active mobility was recovered first in the first group and last in the third group (the median times were 22 and 52 days, $P < 0.001$). The time taken for normal active mobility of the shoulder to be regained was significantly longer in the subgroup of 63 patients with rotator cuff or nerve lesions and similarly in the subgroup of patients whose dislocation was not reduced within 12 hours.

Fourteen out of 38 cases with axillary or brachial plexus nerve lesions failed to regain good function within 1 year.

REPAIR OF SUBCUTANEOUS RUPTURE OF THE ACHILLES TENDON

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Seventy patients (53 men and 17 women) with subcutaneous rupture of the Achilles tendon during the period 1969–1974 were followed up until 1977. Most injuries occurred in persons between 30 and 50 years of age. Seventy per cent of the injuries were sports injuries.

All patients were operated on: using Lindholm's technique in 42 cases, suturing in 15, Nissen's technique in 5, Sifverskiöld's in 4, Bosworth's in 2, duplication in one and reinsertion to the calcaneal bone in one case. A plaster cast was applied for 6–8 weeks. Fifteen wound infections (9 superficial and 6 deep infections) and one deep thrombosis occurred. There were two reruptures, but the cause was a distinct new trauma in both cases.

According to the patients the result was excellent or good in 97 per cent and fair in 3 per cent. The Achilles tendon was thicker and the calf thinner on the operated side ($P < 0.001$). There was not a significant loss of power of plantar

flexion, nor any notable change in the range of motion. The results were better with an early operation (within 3 days) than with later treatment ($P < 0.05$). Infection had a detrimental effect on the result ($P < 0.001$).

RUPTURE OF THE THORACIC AORTA DUE TO BLUNT TRAUMA: DIAGNOSTIC ASPECTS

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Twelve cases of rupture of the thoracic aorta due to blunt trauma were detected among patients treated in the period 1970–1977. Five pedestrians, one cyclist and one motorcyclist were struck by cars; the other five patients were drivers or passengers involved in car accidents. The clinical signs do not have much diagnostic value; weak or absent pulsations of the femoral artery were seen in two cases; one patient was paraplegic. Seven patients had elevated central venous pressure. The chest X-ray showed blurring of the normally sharp outline of the aorta and a widened mediastinum in all cases, and a left apical extrapleural cap in nine cases. The X-ray signs were most obvious 6 hours after the trauma, and later diminished. The haematomas seen in an X-ray may not be due to the aortic intimal rupture itself but instead may be caused by tears in small arteries and veins. The diagnosis was made using aortography in seven cases, clinically in one case, at operation in one case and during autopsy in three cases. All the ruptures were situated at the proximal descending aorta. Five patients were operated on between 6 hours and 2 months after the trauma. All the operations were successfully performed at the Department of Thoracic Surgery. The aortic rupture was the cause of death in four cases, two patients died from brain injury and one patient from an uncontrollable retroperitoneal haemorrhage.

Aortography should be performed on the basis of the trauma mechanism, elevated CVP and chest X-ray findings.

PROCESSUS SUPRACONDYLOIDEA HUMERI WITH CONCOMINANT COMPRESSION OF THE MEDIAN NERVE

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Compression of the median nerve due to the anatomical anomaly called processus supracondyloidea humeri is a rare condition. One case was described. EMG aided in the diagnosis. The treatment was subperiosteal resection of the process together with the origin of the pronator teres muscle.

PRIMARY MALIGNANT BONE TUMOURS: 874 CASES

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A total of 874 primary malignant bone tumours were registered in Finland during the years 1962–68. All cases were verified by histopathological methods: 124 osteosarcomas, 4 parosteal osteosarcomas, 71 chondrosarcomas, 25 giant cell tumours, 18 Ewing's sarcomas, 13 reticulosarcomas, 6 lymphomas, 545 myelomas, 10 extramedullary plasmocytomas, 4 angiosarcomas, 2 haemangiopericytoma-sarcomas, 14 fibrosarcomas, 4 chordomas, 2 postradiation sarcomas, 1 neurosarcoma, 9 primary malignant fibrous histiocytomas, 19 sarcomas NUD, 1 fibrolipomyxoma malignum, 1 chondromyxoma malignum and 1 fibromyxoma malignum.

50.9 per cent of the patients were males. The mean age of the males was 52.5 years, and that of females 57.0 years. The mean age in cases of osteosarcoma was 31.6, primary chondrosarcoma 42.6, giant cell tumour 36.0, Ewing's sarcoma 19.1, fibrosarcoma 47.0, and myeloma 63.0 years.

Five-year survival rates were: osteosarcoma 28.2 per cent, parosteal osteosarcoma 50.0 per cent, primary chondrosarcoma 35.9 per cent, secondary chondrosarcoma 61.1 per cent, malignant giant cell tumour 60.0 per cent, Ewing's sarcoma 16.7 per cent, reticulosarcoma 15.4 per cent, lymphoma 0/6, solitary myeloma 41.7 per cent, myeloma multiplex 10.8 per cent, extramedullary plasmocytoma 50.0 per cent, angiosarcoma 25 per cent, fibrosarcoma 21.4 per cent, primary malignant fibrous histiocytoma 22.3 per cent.

FRACTURES OF THE THORACIC SPINE

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Ninety-eight patients with fractures of the thoracic spine, treated during the years 1968–1975, were examined (21 per cent of all vertebral fractures). The mean age of the patients was 42 years, range 4–84 years. The duration of hospital treatment was approximately 18 days. Nearly one half of the patients were injured in

traffic accidents. Sixty patients had only one fractured vertebra; three patients had five fractured thoracic vertebrae. Anterior wedge fracture was the most common type of injury; 87 fractures were stable. Only seven patients showed a dislocated corpus fracture. Neurological lesions were noticed in eight patients: paraplegia in five and incomplete medullary and nerve root lesions in three; one patient with paraplegia was treated using operative reduction and plate fixation.

Most often, treatment consisted of bed rest until the patient experienced no pain. Muscle exercises were started immediately. The average duration of bed rest was 18 days.

A follow-up examination was performed in 78 cases, on average 5.3 years after the injury. The movements of the back were considered normal in 55 cases. The neurological findings were unchanged in 75 and worse in three patients. Nine patients were unable to work owing to the injury. The mean duration of work disability was 95 days, range 10–261 days.

REPLANTATION OF AMPUTATED FINGERS AND HANDS

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With the development of microsurgical techniques, replantation has become an alternative form of treatment of amputative injuries in some centres. Case selection is most important in order to obtain acceptable results. Indications and contraindications should be carefully weighed when selecting suitable candidates for replantation. The decision depends on: (1) functional needs of the amputated part, (2) type of injury, (3) condition of the amputated part, (4) level of amputation, (5) time factor, (6) age of the patient, (7) associated injuries and illnesses. These lengthy emergency operations require special arrangements with regard to the operating team, anaesthesia, and postoperative care. In finger replantation, a three-phase system was presented: (a) preparatory and bone stabilizing procedures, (b) volar reconstruction, (c) dorsal reconstruction. Skin colour, temperature, capillary filling, Doppler sounds and blood haematocrit are monitored postoperatively. Complications may arise mainly during the first week and the main causative factor seems to be venous thrombosis in the microanastomosis or in the injured vessels in the replanted part.