

Proceedings

THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS SCIENTIFIC EXHIBITS—1971

Skin Coverage. AMERICAN SOCIETY FOR SURGERY OF THE HAND (Dr. Robert D. Larsen, Detroit, Michigan).

Tears of the Rotator Cuff. Diagnosis and Surgical Management. DR. GEORGE T. ANAST¹ demonstrated the techniques of diagnosis by means of physical examination, the technique of arthrography, including the basic factors in interpretation of the arthrogram, and the fundamentals of the surgical approach of repair.

The diagnosis and surgical correction of tears of the rotator cuff of the shoulder joint are not as difficult as is frequently supposed. This condition, which is far more prevalent than realized by many practitioners, can be diagnosed by an adequate history and attention to certain physical findings. In addition to the history and physical examination, the use of arthrography of the shoulder, a well established procedure, is of great benefit in precise diagnosis in obscure cases.

Once diagnosis is made, surgical correction of the condition by repair of the cuff or excision of the acromioclavicular joint and resection of the medial two-thirds of the acromion is a feasible and highly satisfactory procedure. Repair of the tendon or palliative surgery in patients in whom repair is not possible is accomplished without undue difficulty if the nature of the lesion is recognized and certain principles of shoulder surgery peculiar to injury to the rotator cuff are observed.

Hemophilia: Planned vs. Urgent Orthopaedic Surgical Procedures. DR. ROBERT W. BAILEY, DR. ROBERT N. HENSINGER, DR. FRANK R. NOYES, DR. JOHN A. PENNER, and DR. HAROLD A. OBERMAN, Ann Arbor, Michigan.

A Pathologic Study of Intracapsular Neck Fractures Fixed with the Deyerle Apparatus. MAJOR EARL F. BARRICK², COLONEL GEORGE I. BAKER³, and LIEUTENANT COLONEL GEORGE P. BOGUMILL⁴. The Deyerle multiple pin and plate technique of fixation has been in use at Walter Reed General Hospital for over ten years and has been used in more than 300 hip fractures of all types. Particular interest, however, has been given to the femoral-neck fracture for which the use of this device is thought to enable early weight-bearing, to provide a means of impaction, and, thus, to result in an improved rate of fracture healing. Union occurred in 81 per cent of displaced femoral-neck fractures in our series of forty-three cases, with a 12 per cent rate of avascular necrosis or late segmental collapse and a 5 per cent rate of non-union (*J. Bone and Joint Surg.*, **52-A**: 113-127, Jan. 1970).

Seven hip specimens were demonstrated with clinical and specimen roentgenograms, stained sagittal sections, and photomicrographs. Four specimens were obtained at necropsy at one day, twenty-three days, one year, and four years after fracture. The remaining three specimens were obtained after prosthetic replacement for clinical failure. The clinical result was unknown in the patient who died at one year and whose fracture had fibrous union with evidence of healing along the pin tracts; the result was excellent with union in the patient who died four years after operation.

Findings in this study which probably have general significance are:

1. Early hemorrhage, followed by fibrosis if a blood supply is present, occurs in the pin tracts;
2. The pin tracts may assist in fracture healing by encouraging vascular ingrowth;
3. It appeared that the pins can provide sufficient stability to enable healing in time despite avascular necrosis;
4. Clinical failure with Deyerle fixation can be attributed to mechanical factors, that is, poor reduction and fixation, as well as to late segmental collapse from the initial vascular injury.

Orthopaedic Aspects of the High Jump. DR. MARTIN E. BLAZINA and MISS G. JOANNE CARLSON, University of California Los Angeles Medical School, Los Angeles, California.

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4. Armed Forces Institute of Pathology, Washington, D. C. 20012.

Epicondylitis as an Athletic Injury. DR. LESLIE M. BODNAR ⁵, DR. Z. W. SOBOL ⁶, DR. MARTIN L. TROYER ⁷, DR. DAVID KRIZMAN ⁸, and DR. JACK SCHERER ⁹. Medial or lateral epicondylitis may result from indirect injury in athletics. There is remarkable similarity in the action of the elbow and arm in hitting and throwing in various sports.

The initial wind up, rotation of the body away from the target, the adduction and external rotation and hyperextension of the shoulder are similar in most sports. The propulsive phase in which the body is whipped around to start the forward action, with the elbow in a flexed position, wrists firm and hand closed, advancing the shoulder, then the elbow and then the hand, are also similar in most sports.

The dissimilarity in sports occurs at the moment of release of the object or at the moment of the impact against an object.

In the throwing actions, valgus strain occurs on the elbow as the arm is brought forward with the elbow leading the hand. At that moment the finger flexors suddenly relax and the wrist flexors snap to propel the ball, javelin, and so forth. Therefore, these strains are more likely to cause medial epicondylitis in throwers as well as in other athletes who maintain the open hand, such as handball players, and the like.

In the hitting action, the hand remains closed, maintaining tension on the finger flexors, stabilizing the elbow against the valgus strain, but promoting a varus strain in the follow-through phase in which the arm is carried across the body. Because of this varus strain, hitters such as tennis players and golfers are more likely to suffer lateral epicondylitis.

The exhibit demonstrated the similarity in action of some of the hitting sports and of some of the throwing sports, and a movie further demonstrated these mechanisms. Some atypical actions, such as the leading arm in a golf swing, the back hand in tennis, and the action in bowling, create strain at the lateral epicondyle because of the strain on the weaker extensor muscles at their point of attachment to the lateral epicondyle of the elbow.

Lesions of Bone Simulating Other Lesions. COMMITTEE ON BASIC SCIENCE, THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS, Dr. James S. Miles, *Chairman*.

Continuing Education for Orthopaedic Surgeons—The Academy Courses. COMMITTEE ON CONTINUING EDUCATION, THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS, Dr. Philip D. Wilson, Jr., *Chairman*.

Concepts of Lubrication. COMMITTEE ON BIOMEDICAL ENGINEERING, THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS, Dr. Jack K. Wickstrom, *Chairman*.

Emergency Care Text and Courses. COMMITTEE ON INJURIES, THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS, Dr. George E. Spencer, Jr., *Chairman*.

An Orthopaedic Assistants Program: City College of San Francisco. SUB-COMMITTEE ON THE ORTHOPAEDIC ASSISTANT, THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS, Dr. John J. Niebauer, *Chairman*.

Injuries of the Hand in Athletics. COMMITTEE ON SPORTS MEDICINE, THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS, Dr. Jack C. Hughston, *Chairman*.

C.A.S.E. Computer-Aided Simulation of the Clinical Encounter. COMMITTEE ON UNDERGRADUATE EDUCATION, THE AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS, Dr. Paul H. Curtiss, Jr., *Chairman*.

Experience with Schneider Nailing in Forearm Fractures. DR. JEROME M. COTLER ¹⁰, DR. BASIL J. INGEMI ¹¹, and DR. MAHAVEER P. PRABHAKAR ¹² presented an exhibit summarizing the results of this method of fixation of unstable open and closed forearm fractures. There were eighty-seven patients with greater than a two-year follow-up, including five patients with open epiphyses. It was shown how slight modification of the technique prevented epiphyseal injury.

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The illuminated panels showed the instruments used were simple in design and application.

Photographed roentgenograms of typical examples of fractures of both bones of the forearm, Monteggia fractures, and a forearm fracture in a patient with open epiphyses were illustrated. Of the complications listed there was only one instance of osteomyelitis of the radius following a severe crushing injury and fracture of both bones. There was one case of extensor tendon attenuation and another of attritional rupture. One panel listed all the precautions that should be observed in the technique. In particular, mention was made of avoidance of stressing the junctional area of the nail and its threaded ends in order to prevent its fracture. The great majority of patients exhibited absolute stability after nailing. These fractures were held with pressure dressings for three to six weeks. The remainder were immobilized with a posterior plaster splint or long cast for an average of six weeks.

There were 125 fractures in the eighty-seven patients, and primary healing ensued in 93.6 per cent without bone-grafting. Better than 94 per cent of the patients had excellent or good functional rating based on residual deformity or pain, strength, and range of motion in the arm.

The exhibit included a sound-slide program that operated automatically upon lifting one of three telephones. In this the surgical technique and comparative and result analysis was presented in greater detail. The authors concluded that a very low rate of non-union with very gratifying functional results in the majority are their reasons for continued use of this simple method of fixation of unstable forearm fractures.

Indications for Chromosome Studies in Orthopaedic Conditions. DR. HENRY R. COWELL¹³ and DR. ANTONIO NARVEAZ¹⁴ presented an exhibit which outlined the conditions in which chromosome studies are of value to the orthopaedist. They also reviewed the orthopaedic conditions which are inherited in a mendelian or multifactorial fashion and pointed out that chromosome studies are not indicated in these conditions.

Since there are specific indications for the performance of chromosome studies, it is important to recognize the disorders in which chromosome studies may be of value. They are of value in five distinct areas.

1. Chromosome studies may be used to confirm the diagnosis of a known syndrome, such as a D or E trisomy, mongolism, or *cri du chat* syndrome. These patients may present to the orthopaedist with a vertical talus, polydactyly or other congenital anomalies.

2. Chromosome studies will show whether mongolism is caused by non-disjunction and is, therefore, a chance happening, or whether it is secondary to a translocation and, therefore, an inherited condition. This is of importance in genetic counseling.

3. Chromosome studies are useful in the investigation of children with multiple congenital anomalies in many systems with unusual facial appearance and mental retardation. Evaluation of these children may lead to the description of new chromosomal abnormalities.

4. Chromosome studies are useful in the work-up of a couple with infertility since Klinefelter's or Turner's syndrome may be confirmed by these studies.

5. Chromosome studies are useful in the diagnosis of individuals with chronic myelogenous leukemia.

The exhibitors pointed out that in order for an abnormality to be detected, it must involve a significant portion of a chromosome. Since mendelian conditions involve only a single gene, which is less than 1/200 of a chromosome, the defect is too small to detect by chromosome studies and, therefore, chromosome studies are not indicated in mendelian or multifactorial conditions.

Autosomal dominant, autosomal recessive, X-linked dominant, and X-linked recessive orthopaedic conditions were listed and illustrated by photographs, roentgenograms, and pedigrees. Multifactorial conditions, such as spina bifida, club foot, and congenital dislocation of the hip, which are determined by more than one gene (polygenic) or by both genetic and environmental factors, were also illustrated.

In conclusion, the exhibitors showed that there are specific indications for the performance of chromosome studies. Since a chromosome study is a gross test, it should not be surprising that it has little value in the evaluation of mendelian and multifactorial conditions.

Posterolateral Approach to the Infected Tibia. COLONEL JOHN E. BANCROFT¹⁵, MAJOR JOHN A. CRISTINI¹⁶, and COLONEL STERLING B. MUTZ¹⁷. The posterolateral approach to the tibia is applicable for bone-grafting procedures when anterior skin coverage is poor or when active or quiescent osteomyelitis complicates ununited or malunited open fractures of the tibial shaft.

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Large segmental defects in bone are not uncommon following high-velocity war wounds as incurred in Viet Nam. These wounds are often complicated by massive skin and soft-tissue loss, and by sepsis as well as other serious injuries. The creation of synostoses between the tibia and fibula above and below the segmental defect without disturbing the fibrous barrier across the fracture site will provide bone continuity between proximal and distal fragments while isolating the graft site from the area of infection. The exhibit illustrated the technique by use of color photographs of the procedure, supplemented by line drawings showing the approach as it was described by Harmon in 1945. Clinical and roentgenographic data of representative cases from a larger series of posterolateral grafts performed at Letterman General Hospital were also presented to demonstrate the applicability of the technique to selected cases.

Strontium 85 Scintimetry in Orthopaedics. DR. JOSEPH C. DEFIORE, JR.¹⁸, DR. ROBERT B. CAMERON¹⁹, and DR. NITRANJAN S. RANAWAT²⁰ presented an exhibit illustrating the value of ^{85}Sr scintimetry as a diagnostic tool in orthopaedics. A brief description of the technique was included. The following points were emphasized:

1. In conditions such as spontaneous osteonecrosis of the hip and knee, elevated ^{85}Sr scintimetry values precede significant roentgenographic changes by several months, thus providing earlier diagnostic information. The intense repair reaction occurring at the margins of the necrotic segment has been shown to be the site of increased ^{85}Sr activity.
2. The use of a system that quantitates scanning data is preferable to photoscanning techniques in that statistical analysis of the data can be performed.
3. ^{85}Sr scintimetry has been found applicable to diagnosis in a variety of orthopaedic conditions. Of particular interest has been the observation that after six months ^{85}Sr scintimetry values return to normal in osteoporotic compression fractures while fractures secondary to malignant disease maintain elevated ^{85}Sr scintimetry values for longer periods. Illustrations demonstrating the value of scintimetry in the early diagnosis of metastatic disease to the spine and in septic spondylitis were presented.

University of Illinois Halo-Hoop Apparatus. DR. RONALD L. DEWALD²¹, DR. F. WILLIAM SCHROEDER²², and DR. ROBERT D. RAY²³ illustrated a new device which has proved useful in treating severe scoliosis. Previously, Nickel and associates had demonstrated the advantages of the head halo; and as a natural outgrowth of this idea, the exhibitors thought a hoop might provide satisfactory fixation for the pelvis and lower part of the spine. The possibility also suggested itself of connecting the halo to the hoop with four turnbuckle uprights for skeletal traction. With such a device, some of the complications previously encountered might be avoided; and, in addition, distraction and correction of the curves might be accomplished more efficiently before operation.

The exhibit demonstrated techniques of application, of operation, and of nursing care.

The center of the exhibit contained a skeleton with the halo-hoop apparatus applied. The iliac rod position through and through the pelvis was graphically illustrated in this manner. Selected cases from the United States and Hong Kong of scoliosis, tuberculosis, and fracture-dislocation of the spine were presented.

The advantages claimed for the technique were:

1. Elimination of the plaster cast which may decrease pulmonary vital capacity;
2. Control of the pelvis—decompensation of the spine can be eliminated and pelvic tilt or rotation corrected;
3. The patient can stand or walk without losing correction;
4. No pressure sores can develop undetected as happens beneath a cast;
5. Ease of surgery—the apparatus permits both anterior and posterior surgical approaches as a single or as a combined procedure.

Upper Extremity Amputee Training—Early Fitting. LIEUTENANT COLONEL HARVEY J. DEWITT and MAJOR RONALD BAILEY, Wilford Hall U.S.A.F. Medical Center, San Antonio, Texas.

Evaluation of the Curve in Scoliosis. A New Geometric Method. DR. WILLIAM M. DEYERLE and DR. WASSEF MIKHAIL, Richmond, Virginia.

Spondylo-Epiphyseal Dysplasia—A Familial Disease of Variable Phenotype. DR. LIEBE S. DIAMOND, Baltimore, Maryland.

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A Molded Plastic Tape Hand Splint for Use in Contact Sports. DR. JOHN L. DOBSON, Panama City, Florida, MR. OTHO DAVIS, DR. C. ROBERT LINCOLN, and DR. FRANK H. BASSETT, Durham, North Carolina.

Lateral Ligaments of the Ankle. DR. JOHN R. DORR²⁴, DR. VERNE T. INMAN²⁵, DR. CHARLES A. OWEN²⁶, DR. JEROME BERNHOFT²⁷, and DR. TORSTEN JACOBSEN²⁸. The anatomy of the lateral ligaments was presented as related to the common inversion injury of the ankle. The anterior talofibular ligament is tense in all plantar positions, while the calcaneofibular is posteriorly directed and relaxed in all plantar positions. Inversion injury usually occurs in plantar flexion and the anterior talofibular ligament is, therefore, involved commonly as an isolated injury or in combination with injury to the calcaneofibular ligament. Clinical diagnosis of specific ligament injury depends upon careful palpation, testing for anterior drawer sign, and presence of inversion stress pain with the foot in neutral and plantar positions. Stress roentgenograms in lateral projection show anterior displacement of the talus on the tibia with isolated or combined anterior talofibular ligament rupture. Anteroposterior inversion stress studies may show no instability with the foot plantar flexed. Sequelae to lateral ligament rupture include ligament ossification, formation of an intra-articular fibrocartilaginous flap, and talar-dome defects.

Orthopaedic War Surgery, 85th Evacuation Hospital, Viet Nam, 1968. LIEUTENANT COLONEL RICHARD C. ELTON²⁹ presented an exhibit of photographs illustrating various problems encountered in over 1,000 surgical procedures for war injuries in the combat zone, including over 350 primary surgical débridements of major extremity missile wounds. Patient population was mixed between American servicemen and South and North Vietnamese patients. The key to performing a good wound débridement was found to be the skin and fascial incision. These had to be long enough so the surgeon could easily identify the length, breadth, and depth of the missile wound and so that wound edema resisted by constricting fascia would not compromise the circulation of blood and lymph. Remaining dead tissue was the cause of post-débridement wound infection. Its removal was the goal of wound débridement, and the utilization of delayed wound closure allowed the surgeon to freely re-débride wounds as the dead tissue became more readily identifiable by virtue of necrosis. Viable bone and tendon tissue, although devoid of soft-tissue cover, remained viable under a simple gauze dressing until the wound was eventually closed by delayed primary closure, secondary suture, or split-thickness skin-grafting. Knee-joint wounds were managed by arthrotomy, removal of injured capsular tissue, osteochondral fragments, and injured menisci, as well as removal of the metal missiles. The synovium was often managed by delayed primary suture in three to five days when the skin was also closed. Approximately 100 hand wounds and many foot wounds were treated and the principle of the open dressing and delayed primary closure worked equally well as for wounds of joints and the long bone segments. Débridement of bone was at times complicated by the conflicting desires to retain useful fragments and to remove dead fragments which might serve as a source for chronic osteomyelitis on the other. It was concluded that washing the bone fragments carefully was a minimum requirement for adequate primary wound care. Divided nerves were not repaired primarily.

Anterior Cervical Fusion by the Robinson-Smith Technique. DR. DAVID L. FILTZER³⁰, DR. NEAL I. ARONSON³¹, and DR. MERWYN BAGAN³² presented an exhibit illustrating the use of anterior discectomy and interbody fusion by the Robinson-Smith approach for the treatment of degenerative cervical-disc disease, including mid-line and posterolateral protrusions of soft disc material, and spondylosis of the cervical spine in more than 350 patients with more than 525 disc spaces involved. The level or levels of fusion were selected on the basis of the clinical picture, the findings on plain roentgenograms and at myelography, and open discometric determinations. (The authors had abandoned discography.) The results as determined by a questionnaire follow-up of 108 patients (thirty-five of them with soft disc protrusions) were reported. All but five patients listed themselves as improved. Postoperative roentgenograms and myelograms had demonstrated the correction of vertebral wedging and foraminal constriction, as well as disappearance of the myelographic defects produced by soft disc protrusion and spondylosis. The advantages and the dis-

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advantages of the operation were listed. The definite contraindications described by the authors were generalized stenosis of the cervical canal, advanced spondylosis at many levels, and a complete myelographic block. Myelographic evidence suggesting migration of protruded disc material away from the interspace was also suggested as a rare contraindication to the anterior approach. It was noted that severe osteoporosis might be expected to predispose to failure of fusion.

The authors concluded that the technique is safe, effective, and reliable. The most serious complication in their series had been a non-fatal pulmonary embolism in one patient.

Reference was made to their previous description of the technique (*J. Neurosurg.*, 29: 397-404, 1968) and to their report of excision of a soft disc protrusion through the anterior approach (*J. Neurosurg.*, 32: 721-722, 1970).

The Telltale Nail. DR. VICTOR H. FRANKEL³³, DR. ALBERT H. BURSTEIN³⁴, MRS. LAURAE LYGRE³⁵, and MR. RICHARD H. BROWN³⁶ illustrated the use of the telemetric hip nail in determining the functional loads which such an appliance must bear during the early postoperative period. The fundamentals of the mechanical behavior of such appliances were presented, and the importance of determining the loads on hip nails during such activities as nursing care and early ambulatory exercise was emphasized.

The electronic makeup of the telltale nail was shown, and a working model was available for demonstration. The results from use of the first two nails were presented. These results showed the loads which were imposed on the nail in such procedures as getting the patient on a bedpan, straight-leg raising in bed, early ambulation with a cane, crutches, and walker.

The question was raised, does one rest the hip joint if one keeps the patient in bed following surgery. A device was demonstrated which proved useful in assessing inservice load data following fracture or surgery about the upper end of the femur. A patient was kept at bedrest for two months after internal fixation of an intertrochanteric fracture with a rather weak nail plate. The plate broke at the first screw hole two months after fracture fixation. The patient's only activities had been those associated with bed nursing care.

The telltale nail is a strong nail-plate with roughly the same over-all dimensions as the Sarmiento H-beam nail. The plate and proximal end of the nail are hollow. Strain gauges are placed on the inside of the hollow nail. The electronic equipment of the strain gauge bridges are placed in the plate. A two-channel AM FM telemetry system with a magnetic switch that can be activated from the outside and the proper mixing circuits are also placed in the plate. A battery pack is placed in the proximal end of the nail. A potting material is used to seal off the electronic components, a layer of silastic is then applied, and a cover plate is applied to the plate, producing a watertight seal. Nails were tested to destruction in a bending press without rupture of the watertight seal.

In the first three patients examined there was very little difference in the bending moment at the nail-plate junction or load on the tip of the nail-plate whether the patient was kept in bed or allowed to walk with support. Loads were of the same order of magnitude in the patient who was kept in bed and nursed by turning, supine or prone, or to the operative or non-operative side, assisted in sitting and dangling, transferred to a wheel chair, or allowed to walk in a hip spica cast with the support of a walker. Exercises which produced the highest load were straight-leg raising, knee-chest movements, and internal and external rotation against resistance of the limb operated on when the cast was not on. The spica cast protected the hip joint against high loadings.

Post-Menopausal Osteoporosis. DR. HAROLD M. FROST³⁷ and DR. CHARLES HANSON³⁸. Twenty years ago, the body's collections of osteoblasts and osteoclasts were conceived as functionally independent and single collections of cells, from which the increased bone loss characterizing the osteoporotic state was quite naturally inferred to result from an acceleration of bone resorption.

But studies done within the past decade in many laboratories leave little doubt that a physiological connection exists between bone resorption and bone formation so that they do not form truly independent collections of cells. Furthermore their activities occur on three functionally independent bone surfaces, the cortical/endosteal, haversian, and periosteal. Morphometric studies have shown that the increased bone loss of the osteoporotic skeleton occurs primarily on the cortical/endosteal (and trabecular) surfaces, which, be it noted, are exposed to the tissues of the marrow cavity. Since blood-borne regulatory agents, acting directly on bone cells to cause enhanced bone

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loss, should exert such effects on all three bone surfaces (the same blood brings the same substances to the cells on each of them) one must infer that the target organ for any such agents represents the bone marrow soft tissues which, as a secondary spin-off effect, then modify the behavior of those bone cells not shielded from them by interposed bone, to wit, the osteoblasts and osteoclasts on the endosteal envelope of the skeleton.

Thus it appears that post-menopausal osteoporosis represents primarily a bone marrow tissue disease, and only secondarily a skeletal disease.

Cervical Discopathy and a New Concept in Sympathetics of the Cervical Spine and Head. DR. T. GHAVAMIAN ³⁹, presented an exhibit summarizing the results of a study of over 1000 cases of cervical disc, and head, shoulder, and arm pain. All patients were seen and followed-up by the author for a period of one to six years.

Results of the dissection of fifty-four necks by the author at the Dissection Hall of the University of Washington was also included. The anatomy and surgical technique of decompression of the spinal cord and foraminotomy through an anterior approach also was presented with dissected anatomical specimens.

A movie of a patient presenting the clinical picture of ataxia and nerve-root entrapment due to disc protrusion and the same patient postoperatively relieved of his ataxia and weakness was shown.

One major finding during these studies which seems original and has not been explained previously: Classically it was believed that nerve roots—the sixth and seventh cervical—do not contain sympathetic fibers while entering the intervertebral foramen. The author's findings show this concept to be different, actually both the sixth and seventh cervical-nerve roots contain sympathetic fibers and are richly connected to the deep sympathetic ganglions around the vertebral artery. The clinical implication of this in the surgical treatment of migraine headache was documented and emphasized.

Again, contrary to somewhat classic belief, the author tried to emphasize the presence of the sympathetic cells at the intermediolateral fasciculi of the cervical spinal cord, the only difference being migration of these fasciculi anteriorly so that their cells are incorporated in the anterior horn of the gray matter.

The exhibit also contained a statistical breakdown of the preoperative and postoperative findings, along with the results of conservative and surgical treatment. Roentgenograms, myelograms, and surgical complications were also presented. Pictures of actual anatomical specimens showing the impingement of the protruded disc on the spinal cord and the resulting myelopathy were part of the exhibit.

In the treatment of persistent migraine headache, surgical decompression of the cervical nerve roots proved to be an effective therapeutic tool in this series. The therapeutic responses also shed some light on the etiology of migraine headache.

Candid Pictures from Past Meetings or "Who's That?" DR. ROBERT J. GRAHAM, Moline, Illinois.

Fractures of Long Bones with Arterial Injury Due to Blunt Trauma. DR. E. R. GUISE ⁴⁰, DR. R. F. SMITH ⁴¹, DR. D. E. SZILAGYI ⁴², and DR. J. P. ELLIOTT ⁴³ summarized a six-year review of fractures due to blunt trauma seen at Henry Ford Hospital. All lacerating, explosive, or high-velocity-missile injuries were eliminated. There were six open wounds and four closed wounds. The duration of arterial occlusion was between three and seventy-five hours. The arterial occlusion was disruption followed by thrombosis in six cases and contusion with thrombosis in four cases. Thrombectomy and repair were performed in all cases and seven of ten cases had internal fixation. One case of inadequate fixation was shown resulting in rethrombosis. The three subsequent amputations included an above-the-knee amputation, a Syme amputation, and a below-the-knee amputation. Two of the three amputations were in patients in whom repair was done seventy-two hours or more after the time of arterial occlusion. The exhibit stressed the need for prompt diagnosis and early repair with adequate internal fixation of the fracture if feasible. Angiography without delay was advocated if there was any question of the adequacy of circulation to the extremity. The team work necessary for an aggressive operative approach to prevent unnecessary morbidity and loss of limb was strongly stressed.

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Photoelastic Stress and Strain Analysis of Total Hips and a New Total Hip Replacement. DR. EDWARD J. HABOUSH, New York, N.Y.

Knee Ligament Injuries—A New Method of Postoperative Immobilization. DR. WILLIAM B. HANSON, DOTHAM, ALBAMA.

Progressive Changes in the Hip Joint in the Seropositive Rheumatoid Arthritic. DR. CARL M. HARRIS, Rochester, New York.

Improved Total Hip Replacement. DR. WILLIAM H. HARRIS ⁴⁴ featured a new design for total hip replacement. The acetabular component consists of a Vitallium outer shell, containing a replaceable insert of high density polyethylene. The sphere of the Vitallium femoral component is twenty-six millimeters in diameter. This design has five major advantages compared with a twenty-two millimeter head and a forty-four millimeter socket:

1. The thickness of the high-density polyethylene is increased;
2. The range of motion is increased, both initially and as wear occurs;
3. Stability is enhanced by the use of a twenty-six millimeter femoral head that is countersunk into the acetabular component;
4. The load per unit area is reduced by using a twenty-six-millimeter head;
5. The high-density polyethylene is replaceable without disturbing the cement.

A Multidisciplinary Approach to the Design and Evaluation of Ceramic Implants. DR. LARRY L. HENCH, DR. WILLIAM C. ALLEN, DR. THEODORE K. GREENLEE, and MR. GEORGE PIOTROWSKI, Gainesville, Florida.

Make Your Own Orthopaedic Teaching Aids. DR. HOWARD P. HOGSHEAD and DR. JOSEPH MORRIS, Gainesville, Florida.

Five Years' Experience in the Use of a Self-Powered Portable Surgical Drill in Orthopaedic Surgery. DR. DAVID B. HORNER and DR. ANTHONY F. DALY, Inglewood, California.

Fireworks Injuries to the Hands of Children. DR. ROBERT L. HORNER ⁴⁵, DR. JAMES K. STYNER ⁴⁶, and DR. FLOYD BRALLIAR ⁴⁷ presented an exhibit which showed representative cases of severe fireworks injuries. These injuries continue in spite of attempts at education and legislation. The medical profession should help through public education and encouraging good fireworks laws and their enforcement in every state.

For almost 200 years the Fourth of July has been a time of celebration. For children, the most exciting part has been the display of fireworks, but too often, a child has tried to handle fireworks himself with resulting tragedy. At Denver Children's Hospital, we have treated a number of youngsters who have had serious injuries to their hands and their cases are presented to show the damage that can be done by fireworks and explosives.

A sixteen-year-old boy lit a cherry bomb and was starting to throw it when it exploded, damaging the soft tissues over all the fingers and much of the palm. After excision of destroyed tissues, the nerves and tendons were exposed and even after coverage with a pedicle flap from the torso, full function could not be restored.

A nine-year-old boy bought a smoke bomb at a "safe and sane" fireworks stand. It probably was a mislabeled cherry bomb. It blew soft tissue out of his thumb, index and long fingers, resulting in permanent scarring. Function is good, but the scars are still tender.

A thirteen-year-old boy thought he could improve on a conventional cherry bomb by taking the powder out of several of them and packing it into the shell of a golf ball. He was testing a home-made fuse in his bedroom. He realized he could not put it out and as he ran through the house past his astonished mother, the bomb blew off in his hand destroying the fingers with their metacarpals and damaging the thumb. The only thing that could be salvaged was a thumb that he could use against a partial hand prosthesis. He was helped by special psychiatric care at the amputee center at Children's Hospital, but it was many months before he was willing to show his hand to his school mates.

A six-year-old boy could not wait until dark to light his sparklers. He and his two cousins entered an empty water trailer on their farm. The darkness of the tank helped show off the fireworks to good advantage and gasoline that they took with them in an open bucket helped them

44. Massachusetts General Hospital, Boston, Massachusetts 02114.

45. 1666 South University Boulevard, Denver, Colorado 80210.

46. 1000 South 13th Street, Lincoln, Nebraska 68508.

47. 1666 South University Boulevard, Denver, Colorado 80210.

light the sparklers faster. The resulting explosion critically burned the three children and one of them died several days later. One boy's burns contracted. The hands became seriously deformed. The wrist was drawn into severe extension. The metacarpophalangeal joints hyperextended 90 per cent and the middle joints of the fingers became fixed in flexion as the extensor tendons were burned out. This left the boy virtually helpless as he could pick up things only by pressing them between his two palms. He had no grip or pinch and could not feed or dress himself. Reconstruction of the hand was possible only after removal of contractures. The hand was then stabilized in a functional position. Since the extensor tendons had to be lengthened and the metacarpophalangeal joints opened, not only skin, but some subcutaneous tissue had to be replaced. A free skin graft on these open joints would have prevented motion. A large pedicle flap from the torso was used to cover the left hand and, later, a similar procedure was done on the right. He can now use his hands quite effectively, but how much better it would have been if parents had realized what these three children were up to and had supervised the use of the sparklers.

A fourteen-year-old boy was hoping to launch a rocket with an explosive mixture made from match heads and shotgun powder and cherry bombs. The blast stripped the tissues off the thumb and much of the index finger with a flap saved from the dorsum of the removed finger. Hand function has been surprisingly good and, as occasionally occurs with a child, sensation has returned to the thumb so he can tie his shoes and dress himself with minimum difficulty.

When a twelve-year-old boy could not buy firecrackers, he remembered explosives are frequently left in abandoned mines throughout the Rocky Mountain area. A blasting cap responded to his hammer blowing the pads off each of his digits. After several operations, he does have a useful hand, but without complete sensation. He will never have full function.

Many communities such as Denver have come to the realization that there are no "safe and sane" fireworks for children. Physicians should take the initiative in reminding the community leaders of the dangers of fireworks. Further education and legislation will be needed.

Management of Small-Caliber Low-Velocity Gunshot Fractures. DR. W. SLOCUM HOWLAND, JR.⁴⁸, and DR. STERLING J. RITCHEY⁴⁹ presented an exhibit outlining the proper management of civilian gunshot fractures, the majority of which result from low-velocity small-caliber weapons. The exhibit was based on a retrospective study of seventy-two extremity fractures which resulted from civilian gunshot wounds and had been treated at a large civilian teaching hospital.

Shotgun injuries were not included, as these wounds often require careful formal débridement and are usually associated with significant contamination.

The first portion of the exhibit emphasized the difference between military injuries, which are usually high velocity, and civilian injuries, which are usually low velocity. The extent of tissue damage inflicted by a bullet is dependent on numerous factors, the most important of which are muzzle velocity and missile weight. Damage to tissue at a distance from the wounding tract is characteristic of high velocity weapons, but with those of low velocity there is no cavitation phenomenon or shock wave and thus necrosis of tissue is usually not a problem.

The second portion of the exhibit showed eight illustrative cases of civilian gunshot fractures, including the humerus, forearm, hand, femur, knee, tibia, and foot. All of these patients had a satisfactory result, and brief histories as well as representative roentgenograms were displayed.

The third section of the exhibit portrayed the results of the retrospective study of patients on which the exhibit was based. This study pointed out that many civilian cases could be handled safely as out-patients and very few required or benefited from formal débridement. Retained missiles, especially in the hand or foot, were often painful and required later excision. No beneficial effect could be ascribed to the use of antibiotics and the majority of the patients did not receive antibiotics at any time during their course of treatment.

The final portion of the exhibit illustrated the recommended treatment for a typical fracture resulting from a low-velocity small-caliber weapon; tetanus prophylaxis, cleaning of entrance and exit wounds with local débridement of any obviously devitalized tissue, application of sterile dressing, and then appropriate treatment of the specific fracture. A satisfactory result can be anticipated with carefully supervised conservative management in the majority of cases.

Renal Osteodystrophy in Children and the Effect of Hemodialysis and Renal Transplantation. DR. ALVIN S. ISAACSON⁵⁰, DR. RICHARD C. FINE⁵¹, and DR. JOSEPH PEUSS⁵². Renal osteodystrophy in children is manifest in three indistinct bone abnormalities. It is represented by rickets-

48. Grady Memorial Hospital, Atlanta, Georgia 30303.

49. Emory University Clinic, Atlanta, Georgia 30322.

50. 9735 Wilshire Boulevard, Beverly Hills, California 90212.

51. Children's Hospital of Los Angeles, Los Angeles, California 90027.

52. Los Angeles County—University of Southern California Medical Center, Los Angeles, California 90033.

like lesions, due probably to the malabsorption of vitamin D, hypocalcemia, and hyperphosphatemia of the failing kidney. The rachitic-like lesions are primarily of the epiphyseal line.

The lowered blood calcium perfusing the parathyroid gland stimulates it to excessive secretion and this produces the lesions in bone characteristic of hyperparathyroidism—primarily those involving the resorption of cortical structures.

The third abnormality is an unexplained diffuse osteoporosis with or without abnormalities at the epiphyseal lines or at the cortical areas.

The exhibit demonstrated all of these lesions and demonstrated the effect of parathyroidectomy on the lesions of hyperparathyroidism in these children with failing kidneys.

The metabolic alterations of bone produced alterations which led to deformities and structural deficiencies in the child. The demineralization which occurs is associated with fractures in these children. The epiphyseal changes result in linear abnormalities of the long bones and displacement of the major epiphyses.

The failure of hemodialysis to change the severe hyperparathyroidism was seen in one child; improvement in bone architecture with resorption of soft-tissue calcification occurred after parathyroidectomy. In all patients, improvement was seen after transplantation.

In the developing child the linear lesions, such as genu valgum and coxa vara, persisted after transplantation.

Instances of severe osteodystrophy in children with congenitally hypoplastic kidneys which did not require dialysis or transplantation were illustrated by two children, one of whom died and in one of whom parathyroidectomy was done with dramatic results and a return of normal bone architecture.

Measurement of Ulnar Resonant Frequency. DR. JOHN M. JURIST, Madison, Wisconsin.

Intertrochanteric or Subtrochanteric Fractures : 401 Hips Treated by A Collapsible Nail. DR. ROBERT P. KELLY ⁵³, DR. TAYLOR W. GRIFFIN ⁵⁴, DR. EDWARD S. FORRESTER ⁵⁵, DR. F. BALDWIN HARRINGTON ⁵⁶, and DR. JOHN H. MURPHY ⁵⁷.

The exhibit was designed to accomplish a fivefold purpose:

1. Review the mechanical problems related to the healing of fractures and particularly the healing of intertrochanteric and subtrochanteric fractures.

2. Define the requirements.

3. Review the history of internal fixation of intertrochanteric and subtrochanteric fractures.

4. Examine the mechanics induced at the fracture site by various types of implant.

5. Demonstrate the effectiveness of the device used and emphasize an essential technical step—"yoking"—in using it.

The exhibitors' views of the mechanical aspects of fracture healing, especially as related to internal fixation, were set forth by drawings and legends. A stable intertrochanteric, an unstable intertrochanteric, and a subtrochanteric fracture were illustrated. A personality-oriented presentation of the history of internal fixation of these fractures was made. Failures of most commonly used nails were shown, and the subject nail was illustrated by a color photograph. The subject of strain gauges was introduced and its fundamental illustrated. "Yoking" was depicted in drawings and presented in the form of a working model, manipulable by visitors to the exhibit. Three series of strain-gauge studies were shown on a group of five femora fixed by four different types of nail. The nail advocated was a sliding nail with slots instead of holes for screws in the plate element. It was used in each of the last two femora but yoking was not carried out in one and was carried out in the other. The same nail was used in the same bone in each of the five series. The first three leading up to the unstable fracture were shown in the exhibit by means of color photographs. The fourth series was not shown because production of the simulated unstable fracture isolated the strain gauge from presumed paths of stress and the readings seemed fairly meaningless. The series shown was in the same preparations and an anteromedial strain gauge and these preparations produced data which, along with the earlier series gave strong support to exhibitors' thesis that the subject nail used in conjunction with the yoking procedure promotes compression across the fracture line and tends somewhat proportionately to limit bending strain on the implant.

Clinical data indicated relatively excellent results for the fractures considered, all treated by the subject nail. Failures were shown and causes for failures analyzed.

These points led to conclusions favoring the use of the subject nail along with the technique

53. Emory University Clinic, Atlanta, Georgia 30322.

54. 125 W. Plymouth Avenue, DeLand, Florida 32720.

55. 1021-15th Street, Augusta, Georgia 30901.

56. 2501 Fall Hill Avenue, Fredericksburg, Virginia 22401.

57. Georgia Institute of Technology, Atlanta, Georgia 30332.

of yoking. The favorable mechanics generated by the nail was considered implicit in the results of the strain-gauge studies and the clinical results shown.

Pressure Reducing Procedures for Hip Osteoarthritis. DR. HERBERT KNODT, Columbus, Ohio, DR. PAUL MAQUET, Aywaille, Belgium, DR. FRANZ ENDLER, Vienna, Austria, and DR. ROBERT C. C. CHIU, Columbus, Ohio.

Iliac Vein Occlusion Prior to Amputation for Sarcoma. DR. P. G. KUEHN, DR. H. J. TAMONEY, and DR. HARRY R. GOSSLING, Hartford, Connecticut.

A Modified Bankart-Putti-Platt Shoulder Capsulorrhaphy. CAPTAIN C. S. LAMBDIN ⁵⁸, COMMANDER S. B. YOUNG ⁵⁹, LIEUTENANT COMMANDER C. L. UNSICKER ⁶⁰. The exhibit presented a brief written and pictorial description of a shoulder capsulorrhaphy utilizing the axillary fold skin incision and a pull-out wire capsule-to-osseous-glenoid suture. Advantages listed were excellent exposure, simple repair, short operating time, and removal of foreign material after completion of healing. Experience with over fifty patients followed an average of thirty-four months was related. The rate of recurrence was less than 5 per cent.

Bioengineering Research Application in Lower Extremity Orthotics. MR. H. R. LEHNEIS, DR. E. W. LOWMAN, DR. N. C. KESTLER, DR. J. E. SARNO, MR. WARREN FRISINA, MR. GLENN H. GOLDFINGER, MR. HERBERT W. MARX, and MR. ROBERT G. WILSON, JR.

Comparative Standing and Recumbent Lateral Roentgenograms of the Lumbosacral Spine with Emphasis on Spondylolisthesis. MAJOR ROBERT W. LOWE ⁶¹, MAJOR T. DAVID HAYES ⁶², CAPTAIN JEREMY J. KAYE ⁶³, LIEUTENANT COLONEL RAYMOND J. BAGG ⁶⁴, and COLONEL CLAUDE A. LUEKENS ⁶⁵ presented an exhibit demonstrating that an increase in the percentage of displacement of vertebrae with spondylolysis and spondylolisthesis may be visualized in some cases when a lateral roentgenogram of the lumbosacral spine made standing is compared with the usual lateral roentgenogram made recumbent.

Patients with mechanical low-back pain often are most symptomatic after prolonged standing and sitting and often are relieved of their symptoms by reclining. However, the usual roentgenographic evaluation is a recumbent evaluation. By making an additional standing lateral roentgenogram to reflect the dynamic status of the lumbosacral spine and comparing this with the usual recumbent roentgenogram, a significant number of patients with spondylolysis are found to have spondylolisthesis or in patients with spondylolisthesis the percentage of forward displacement increases. The dynamic status of the lumbosacral spine can be further delineated by standing lateral flexion and extension roentgenograms.

Paired supine and standing lateral roentgenograms were shown in eight patients. Apparent spondylolysis was shown to be definite spondylolisthesis on the standing roentgenograms in four of the eight patients. It was demonstrated in one patient that degenerative or pseudospondylolisthesis may be diagnosed earlier with a standing lateral roentgenogram. In another patient the recumbent lateral roentgenogram showed essentially normal alignment, but suggestive of spondylolysis, while the standing lateral roentgenogram demonstrated spondylolisthesis with 12 per cent displacement.

In four patients with spondylolisthesis, the percentage of displacement was greater on the standing lateral roentgenogram than seen on the recumbent lateral roentgenogram—in one patient the displacement increased from 42 per cent on the recumbent lateral to 62 per cent on the standing lateral roentgenogram.

It is thought that the additional information gained by a comparison of the recumbent lateral roentgenogram with the standing lateral roentgenogram can be helpful in the selection of treatment for the patient with backache.

How to Establish the Cause of Loss of Motion in the Hand. DR. JOHN E. MICKS ⁶⁶ and DR. DONALD L. HAGER ⁶⁷. Causes of loss of motion in the hand were illustrated primarily by photo-

58. United States Naval Hospital, Portsmouth, Virginia 23708.

59. United States Naval Hospital, Long Beach, California 90801.

60. United States Naval Hospital, Portsmouth, Virginia 23708.

61. 1611 Thirteenth Avenue, Huntington, West Virginia 25712.

62. William Beaumont General Hospital, El Paso, Texas 79920.

63. William Beaumont General Hospital, El Paso, Texas 79920.

64. William Beaumont General Hospital, El Paso, Texas 79920.

65. William Beaumont General Hospital, El Paso, Texas 79920.

66. 2010 Wilshire Boulevard, Los Angeles, California 90057.

67. 326 West 23rd Street, Los Angeles, California 90007.

graphs with descriptive captions, arranged according to the tissue involved—bone, joint, tendon, nerve, muscle, and skin. A functioning model of the hand, measuring somewhat under two meters in over-all length, demonstrated the standard anatomy, balance of the hand, and causes of loss of motion. Cardboard models showed the effects of joint capsular fibrosis and the functional anatomy of the oblique retinacular ligament.

The Ambulant Treatment of Femoral Fractures. LIEUTENANT COLONEL JOSEPH H. MOLL ⁶⁸, MAJOR STEPHEN R. THOMAS ⁶⁹, COLONEL CHARLES W. METZ ⁷⁰, MAJOR DANIEL C. MORGAN ⁷¹, COLONEL PHILIP A. DEFFER ⁷², LIEUTENANT COLONEL IRA A. ROSCHELLE ⁷³, and MAJOR FLOYD G. GOODMAN ⁷⁴, presented an exhibit which reviewed the progress of the ambulatory treatment of lower-extremity fractures beginning with the efforts of Delbet of France in 1916. The authors noted the contributions of Dehne, Sarmiento, and Mooney in the development of ambulatory techniques which produced high rates of fracture union during recent decades.

The exhibit illustrated three basic techniques for the application of lower extremity casts utilizing prosthetic-orthotic principles of total contact quadrilateral configuration to the thigh, fixed suspension of the thigh cast and joint mobility by applying external knee joints to the cast. Although the techniques of cast or cast-brace application varied, the principle of gaining early controlled weight-bearing and joint mobilization was demonstrated to gain progressive physiological use of the extremity and prompt fracture union.

Most of the patient material presented consisted of young adult men with combat-incurred open femoral fractures from missile injuries.

Cast protected ambulation was initiated after three to nine weeks of skeletal traction.

Brooke General Hospital reported 102 fractures (seventy open; thirty-two closed). Average healing time by clinical and roentgenographic examination was 7.8 months. Non-union occurred in only two cases. There were no significant complications from the cast treatment.

Walter Reed General Hospital reported fifty-one cases (thirty-six open; fifteen closed) with no non-unions and no significant complications from the cast treatment.

Valley Forge General Hospital reported twenty cases (80 per cent due to gunshot wounds) with no non-unions and no significant complications from the cast treatment.

The treatment program of early ambulation in plaster was especially valuable in gaining a high rate of union in severely injured extremities due to missile wounding where even delayed internal fixation is fraught with a considerable complication rate.

The Modified Blair Fusion for Fracture of the Talus. DR. HARRY D. MORRIS ⁷⁵, DR. A. WILLIAM DUNN ⁷⁶, and DR. WILLIAM L. HAND ⁷⁷ demonstrated, by means of color illuminated transparencies, the mechanism of extrusion of the talar body in fracture-dislocation. It was shown that the neck of the talus is fractured by impact against the anterior margin in sharp dorsiflexion. Further dorsiflexion causes anterior dislocation of the foot. The sustentaculum tali of the calcaneus hooks in front of the body of the talus. When dorsiflexion force ceases, the foot plantar flexes and slides backward, carrying the fractured body of the talus out of the tibiofibular mortise and twisting it. The technique of the Blair arthrodesis was shown by color transparencies. After excision of the talar body, a sliding graft from the anterior part of the distal end of the tibia is embedded into the remaining talar neck. Cancellous bone is packed around the lower end of the graft. In Morris's modification, a screw is inserted through the upper end of the graft into the posterior cortex of the tibia and a Steinmann pin is driven across the calcaneus into the distal end of the tibia to hold the foot in 10 degrees of equinus position for six weeks. Roentgenograms of two illustrative cases were presented. One patient had avascular necrosis of the body of the talus after an undisplaced fracture of the talar neck. The other patient had a fracture-dislocation of the talar body with extrusion of the body. In the ten cases presented, the procedure was performed in two for avascular necrosis of the talar body and in eight for fracture of the neck with extrusion of the body. Good to excellent function with pain relief was obtained in all cases.

Positive Contrast Arthrography of the Knee. DR. ANDREW A. McBEATH ⁷⁸, DR. HERMAN W.

68. Brooke General Hospital, Brooke Army Medical Center, Fort Sam Houston, Texas 78234.

69. Brooke General Hospital, Brooke Army Medical Center, Fort Sam Houston, Texas 78234.

70. Walter Reed General Hospital, Walter Reed Army Medical Center, Washington, D. C. 20012.

71. Walter Reed General Hospital, Walter Reed Army Medical Center, Washington, D. C. 20012.

72. Valley Forge General Hospital, Phoenixville, Pennsylvania 19460.

73. Valley Forge General Hospital, Phoenixville, Pennsylvania 19460.

74. Valley Forge General Hospital, Phoenixville, Pennsylvania 19460.

75. 1514 Jefferson Highway, New Orleans, Louisiana 70121.

76. 1514 Jefferson Highway, New Orleans, Louisiana 70121.

77. 1514 Jefferson Highway, New Orleans, Louisiana 70121.

78. Division of Orthopedic Surgery, University of Wisconsin, 1300 University Avenue, Madison, Wisconsin 53706.

WIRKA ⁷⁹, CAPTAIN MELVIN RICHARDS ⁸⁰, and DR. JAMES COMBS ⁸¹ presented an exhibit of drawings, roentgenograms, arthrographs, and photographs to demonstrate the diagnostic value of single contrast arthrography of the knee. The exhibit included indications for performance, technique, examples of meniscus and non-meniscus lesions of the knee, and the results and complications of 267 arthrograms.

The indications stated for performing this procedure were:

1. The severely injured knee without ligamentous injury warranting surgery.
2. The mildly injured knee not responding to expectant treatment.
3. Patients with vague, non-specific complaints who have no specific findings—many of them women.
4. Individuals with questionable motives, such as convicts or plaintiffs.
5. Knees in which a suspected lesion is difficult to localize.

A brief description of technique was illustrated.

Non-meniscus lesions shown included ruptures of the medial collateral and anterior cruciate ligaments, villonodular synovitis, suprapatellar pouch obliteration, and articular cartilage status in osteochondritis dissecans.

Examples of the three basic patterns of meniscus tears were shown—vertical longitudinal, vertical transverse, and horizontal. Illustrative cases of meniscus lesions included a tear in a retained posterior horn.

Two hundred sixty-seven arthrograms were reviewed. When compiling results only meniscus lesions were considered. Of the 136 knees not explored, ninety-five were normal or had lesions not warranting surgery. Forty-one were positive but not operated on for various reasons. One hundred thirty-one were explored. In 123 knees the diagnosis was confirmed (seventy-three medial, seventeen lateral, fourteen both medial and lateral, and nineteen normal). Seven false positives and one false negative were found. This shows the procedure to be 93.8 per cent accurate in the knees operated on ($p < 0.001$).

No infections or allergic reactions were encountered in 267 procedures, but transient effusions followed twenty-eight of the procedures.

It has been found that the single contrast arthrogram is a significant aid in the diagnosis of intra-articular knee lesions.

The Wedge Shaped Variable Height Tibial Plateau Prosthesis for Knee Arthroplasty. DR. B. E. McCONNELL, Greenville, Texas.

Orthopaedics Overseas. MEDICO A SERVICE OF CARE (DR. JUSTIN C. McNUTT, Bloomington, Illinois).

Closed Nailing of Femoral-Shaft Fractures (Kuntscher Method). DR. STANLEY H. NAHIGIAN ⁸², DR. JAMES J. RASCHER ⁸³, and DR. JOSEPH R. MACYS ⁸⁴. Since 1966, the Department of Orthopaedic Surgery at St. Luke's Hospital has applied the principles of the Kuntscher method in the closed nailing of femoral-shaft fractures. These are (1) preoperative distraction, (2) deferred surgery, (3) closed intramedullary reaming, (4) no dissection at the fracture site, and (5) large (fifteen to twenty millimeter) diameter cloverleaf nails.

Kuntscher's method requires close attention to detail throughout each phase of the procedure. It is applicable in most femoral diaphyseal fractures in adults who are suitable candidates for general anesthesia. Open or closed diaphyseal fractures can be nailed by this method if they lie ten centimeters distal to the greater trochanter and twelve centimeters proximal to the knee joint.

Contraindications to closed nailing are: (1) clinical evidence of fat embolism, (2) intercurrent infection, (3) unsuitable fractures with longitudinal comminution in either fragment or long oblique fractures. This longitudinal comminution if unrecognized may cause splitting of the shaft during the nailing and in long oblique fractures satisfactory purchase cannot be obtained on both sides of the fracture.

Preoperative preparation is most critical. The patient's injuries must be stabilized. In closed fractures, the distraction is applied in the operating room under local anesthesia. These shaft

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80. Department of Radiology, General Leonard Wood Army Hospital, Fort Leonard Wood, Missouri.

81. 1126 Hathaway Drive, Madison, Wisconsin 53711.

82. 3461 Warrensville Center Road, Shaker Heights, Ohio 44122.

83. St. Luke's Hospital, Cleveland, Ohio 44104.

84. St. Luke's Hospital, Cleveland, Ohio 44104.

fractures are then nailed seven to ten days after injury (range three to twenty-three days).

With open fractures the distraction is applied in the operating room following the appropriate acute wound care. These fractures are nailed after healing of the soft tissues in fourteen to sixteen days (range fourteen to twenty-five days). The patients can be given anticoagulants if indicated.

The most important feature of the preoperative preparation is distraction at the fracture site—ideally approximately one centimeter between the fracture ends. This is best obtained using the distractor which achieves and maintains reduction before the operation.

In bilateral fractures of the femur only the fracture to be nailed first is placed in the distractor. The opposite extremity is placed in balanced skeletal traction up to one-sixth the body weight. The second fracture is nailed one week after the first.

The operative details were depicted in a series of illustrations with emphasis on proper positioning of the patient, placement of the gluteal skin incision, and insertion of the trochanteric awl. The techniques of final reduction and guide-wire placement were described. The hazards of differential reaming or eccentric reaming were illustrated. The length of the nail is measured at operation directly from the guide wire. The diameter of the nail is determined by increased resistance to reaming for six to ten centimeters on both sides of the fracture site. This indicates that there will be good purchase in both fragments by the matched nail. Usually fifteen to twenty millimeter nails are used. The nail is driven slowly with the anesthesiologist monitoring the patient for transient hypotension which occurs occasionally during this stage.

Since adoption of this method in 1966, an incarcerated nail has not been encountered.

Postoperatively the patient is placed in balanced suspension. The drain is removed at forty-eight hours. Bedside physical therapy is started on the first postoperative day and when limb control is attained, crutch ambulation with partial weight-bearing is allowed. In unstable fractures or fractures in the distal third, the postoperative care is altered to compensate for rotational instability. In such patients, balanced suspension or skeletal traction is maintained until the fracture shows roentgenographic or clinical evidence of early consolidation.

Selected difficult cases of closed nailing are illustrated with preoperative, immediate postoperative, and follow-up roentgenograms after healing. These included a case of bilateral femoral-shaft fractures, one open and one closed fracture in the distal third, and a pathological fracture through bone affected by Paget's disease.

The Athletic Trainer Today. NATIONAL ATHLETIC TRAINERS ASSOCIATION (Jack Rockwell, Kirkwood, Missouri).

Non-Surgical Orthopaedic Management of Hemophilic Arthropathy. DR. MAX NEGRI, Los Angeles, California, and DR. JORDON RHODES, Redondo Beach, California.

Untreated Congenital Hip Dysplasia in the Navajo. A Long-Term Follow-up. DR. WILLIAM B. PRATT ⁸⁵, DR. ROBERT H. FREIBERGER ⁸⁶, DR. WILLIAM D. ARNOLD ⁸⁷. Eighteen cases of hip dysplasia were diagnosed roentgenographically in a survey of Navajo children between the ages of two months and seventeen months. This survey was part of the Navajo Cornell Field Health Research Project. It was carried out in the Many Farms area between 1959 and 1962. Roentgenograms were made in 548 (86 per cent) of 628 children. Eighteen were found to have congenital hip dysplasia. Four had frank dislocations. None of the children with hip dysplasia received treatment. In a few cases a Frejka pillow splint had been prescribed but was not used. In the initial study, reported in a supplement to the American Journal of Public Health, Volume 55, February 1965, follow-up of up to four years showed that dysplasia improved. In many cases the hip appeared normal roentgenographically. A clinical examination of a number of these children performed by W. D. A. in 1963 showed stable hip joints with no limitation of motion and all children examined had a normal gait.

In 1968, W. B. P. was stationed at the United States Public Health Service Hospital in Gallup, New Mexico, and he, with the valuable help of the personnel of the United States Public Health Service at the Chinle Health Center, performed clinical and roentgenographic follow-up examination on seventeen of the original eighteen children. All were found to be asymptomatic with normal gait. Clinical examination of all hips was normal. Roentgenographic examination showed the following: normal hips in nine children; questionable minimum hip dysplasia in six children; improved but with persistent dysplasia in two children; and progression of dysplasia to subluxation or dislocation in none of them.

Representative roentgenograms were presented in the exhibit. The findings indicated that

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86. 535 East Seventieth Street, New York, New York 10021.

87. 176 East Seventy-first Street, New York, New York 10021.

congenital hip dysplasia diagnosed roentgenographically at the age of two months or older does not progress to dislocation, but tends to improve, although not always to normal. From these observations as well as from published data, we conclude that hip dysplasia should be treated keeping in mind that there is a tendency to spontaneous improvement.

Prosthetics and Orthotics in North America. COMMITTEE ON PROSTHETICS RESEARCH AND DEVELOPMENT ⁸⁸ (A. Bennett Wilson, Jr., Executive Director). The four phases of the cooperative program carried out in North America in limb prosthetics and orthotics are depicted—namely, fundamental research, design and development, education, and application.

The effective transition of an idea through various phases to general patient application as a result of the cooperative effort of many groups, both governmental and private, is stressed by depicting some of the advances made in the field recently.

A Correlated Ultrastructural Study of Normal and Pathological Articular Cartilage. DR. IRVING REDLER and DR. MARILYN L. ZIMNY, New Orleans, Louisiana, and DR. JOHN RUSS, Medford, Massachusetts.

Arthrography of the Hip: A Useful Adjunct in the Evaluation and Treatment of Hip Disorders in Children. DR. JOHN M. ROBERTS, DR. JOSEPH H. DIMON, III, Atlanta, Georgia, and DR. NEWTON T. CLARK, Decatur, Georgia.

An Improved Knee Disarticulation Prosthesis. COMMANDER D. W. ROHREN, MR. CHARLES ASBELLE, and MR. GERALD PORTER, Oakland, California.

Arthrography of the Knee. DR. JOHN S. ROMINE, Great Lakes, Illinois.

Anatomy of a 63-Yard Field Goal. DR. J. KENNETH SAER and DR. RAY J. HADDAD, JR., New Orleans, Louisiana.

Patient Rehabilitation with Modular Endoskeletal Prostheses. DR. ALAN SMITH ⁸⁹, MR. HENRY GARDNER ⁹⁰, and MR. EARL LEWIS ⁹¹ exhibited below-the-knee, above-the-knee, and below-the-elbow modular prostheses to acquaint orthopaedic surgeons with this recent advance in prosthetic construction.

The term *endoskeletal* is used to indicate that these prostheses provide support through their internal skeleton rather than through their outer shell as in conventional prostheses. The term *modular* is used to indicate that the prostheses are constructed from a number of prefabricated parts. These components can be selected to complete a finished unit which conforms to the patient's needs.

The advantages of this type of prosthetic construction to the patient are quicker fabrication, adjustability once the prosthesis is delivered, and adaptability to changing patient needs. Often these prostheses are lighter than conventional prostheses. Also the cosmetic cover provides a softer, more lifelike texture than present prostheses.

Infections of the Foot. DR. WILLIAM S. SMITH ⁹², DR. ROBERT HENSINGER ⁹³, and DR. WALTER WHITEHOUSE ⁹⁴ illustrated the broad spectrum of subtle roentgenographic variations which occur with inflammatory lesions of the foot. The exhibit was divided into four sections:

1. Acute osteomyelitis: The natural progression of hematogenous osteomyelitis from the initial clinical symptoms to healing was shown. The late occurrence of roentgen signs was emphasized.

2. Chronic osteomyelitis: The changes found in indolent and chronic infections were contrasted. The hallmarks, characteristically, are draining sinuses, increasing destruction, and osteosclerosis. Attention was drawn to the frequent failure of the roentgenogram to reflect the activity of the disease and to the fact that the roentgenographic appearance is rarely associated with a particular diagnosis.

3. Predisposing factors: The most common infections of the foot are secondary to local, systemic, and metabolic conditions. Included in this panel were infections due to lacerations, arteriosclerosis, diabetes mellitus, rigid deformity, and physical agents.

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4. Differential diagnosis: A variety of cases were presented to illustrate that the appearance of metabolic bone disease, benign and malignant neoplasms may simulate infection. Osteolysis and reactive periostitis may be common to both infection and neoplasm; therefore, confusion of the two is sometimes inevitable. Systemic disease may be manifested in the feet as well as in the hand.

Double Contrast Arthrography of the Knee. DR. T. W. STAPLE ⁹⁵. The technique of double contrast arthrography of the knee using meglumine diatrizoate (76 per cent) was demonstrated. Examples of various types of tears of the medial and lateral menisci were shown, together with examples of joint abnormalities not involving the menisci. Four hundred and fifty examinations were used as the source of material for this exhibit. Of these, 244 knees were operated on. Comparison of the roentgenographic and surgical findings produced an accuracy rate of 92.4 per cent over-all. For lesions of the medial meniscus the accuracy rate was 95 per cent and for lesions of the lateral meniscus the accuracy was 88.5 per cent.

Diagnosis and Prognosis of Acute Cervical Spinal Cord Injury. DR. E. SHANNON STAUFFER ⁹⁶, DR. VERNON L. NICKEL ⁹⁷, and DR. PHILIP H. REISWIG ⁹⁸ demonstrated the technique of clinical evaluation of a patient with traumatic quadriplegia secondary to injury of the cervical spine. The patient's initial examination is the most important factor to his prognosis. It is essential to determine if the patient has a complete or partial spinal-cord injury during the first twenty-four hours. The display detailed the pertinent points of differentiating a complete from a partial cord injury. Slight sparing of spinal-cord function as manifest by perianal sensation or voluntary toe flexors may be all that is present to indicate a partial lesion. Patients with a documented diagnosis of complete lesion which persists for twenty-four hours have not demonstrated functional return of spinal-cord transmission. Conversely, all patients who have progressive improvement in cord function will demonstrate physical findings of sparing during the first twenty-four hours. These patients may have marked return of neurological function.

Lack of a carefully documented examination in the initial twenty-four hours after injury renders comparative evaluation of treatment techniques and surgical procedures impossible. Surgical procedures on the acutely traumatized spinal cord have failed to yield evidence of an improved diagnosis when compared with injured spines treated with closed reduction and traction. The neurological improvement from return of injured roots in the area of fracture (root escape) must be carefully differentiated from and not confused with recovery of the spinal-cord function.

The exhibit also demonstrated the basic muscle and sensory examination necessary to document an accurate level of injury. Prognosis for bowel and bladder control can be predicted by presence or absence of voluntary control of sacrally innervated muscles and the presence or absence of sensation in the sacral areas. If a patient has a partial cord injury with sacral sparing, voluntary control of bladder and bowel function may be re-established. If a patient has a complete spinal cord lesion, the possibility of reflex automatic bowel and bladder function can be predicted by the presence of spinal arc reflexes as manifested by the perianal wink and bulbocavernosus reflex.

Compression Nailing. DR. DANA M. STREET ⁹⁹. This exhibit was illustrated with tables and photographs of roentgenograms, also the instruments involved, and showed the use of compression nailing not only in femoral fractures but also fractures of other bones, including the tibia, humerus, radius and ulna, and in hip fusion and knee fusion.

Previous use of the compression principle was illustrated from the work of H. J. Kaessmann and R. M. McAtee, the former using it for the femur and tibia and the latter for fractures of the olecranon.

The apparatus was illustrated with the actual equipment and diagrams. The surgical technique for nailing the femur was illustrated with color photographs which showed the femur nailed by the closed technique with the aid of the image intensifier and distal end of the nail cross pinned, after which the compression cap was applied to the proximal end of the nail.

The use of this method in hip fusion was illustrated with the results in four cases in which compression was thought to have a definite advantage over fusion with the intramedullary nail alone since there seems to be insufficient compression from the muscles spanning the hip joint. The same was true of knee fusion, one of two cases illustrating the combined compression of the fused knee joint and a delayed union of a fracture in the distal third of the tibia.

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96. Rancho Los Amigos Hospital, Downey, California 90242.

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98. Loma Linda University Hospital, Loma Linda, California 92354.

99. Harbor General Hospital, Torrance, California 90509.

The technique in femoral shortening was also illustrated. Here the method was found to be particularly advantageous since the muscle tone of the thigh muscles is slacked off by the decrease of muscle length.

The method was also shown for fractures of the tibia, humerus, radius, and ulna.

In summary, three points appeared most important. First, while medullary nailing of the femur without compression gives excellent results, compression nailing improves stability particularly during the early healing period of the first three weeks, and postoperative support of balanced suspension or a cast is not necessary. Secondly, it assures contact of fracture surfaces giving even pressure. Thirdly, it is particularly advantageous in femoral shortening when muscle tone is necessarily diminished and in hip and knee fusions especially when there are associated fractures of the femur or tibia which can be compressed simultaneously.

Limited Débridement and Cleaning of Contaminated Wounds Using Pulsating Water Lavage.

DR. PAUL J. STUCKER and DR. MERLIN HAMER, San Francisco, California.

The Field Clinic. A Method of Disease Analysis. DR. A. B. SWANSON¹⁰⁰, DR. T. J. WALLER¹⁰¹, DR. G. A. DEGROOT¹⁰², DR. N. R. BOEVE¹⁰³, and DR. A. G. PARDINI¹⁰⁴. The exhibitors' research in the development of joint implants for arthritic or destroyed joints has been in progress since 1962. The initial design and development of flexible implants required consideration of factors relating to anatomy, engineering, material characteristics, and patient needs. The resultant implants were evaluated by machine testing and animal implantation. Their clinical application has proceeded since 1964 when the first silicone rubber implants were used in patients.

Their early experience in this project showed the great need for a large and comprehensive experience to test the feasibility of these implants. For this purpose, they developed the participating field clinic method. They learned that a properly functioning field clinic requires: access to a large number of cases, evaluation and treatment by a varied group of surgeons, retrieval and analysis of preoperative and postoperative data, strict guidelines for treatment and postoperative care, frequent communication, the proper handling of feedback information, a gentleman's agreement not to publish until an appropriate time, and the eventual dissemination of accumulated knowledge.

A field clinic participant should be a volunteer with a basic desire to be involved, should have adequate expertise in evaluation and treatment, and should be conscientious in following treatment guidelines and returning data.

Funds are preferably provided by the individual participants. The home clinic should be independent of outside pressures or constraints.

All preoperative and postoperative data is recorded in code on standardized data sheets provided by the home clinic. Retrieval of data from a computer of the 360 IBM class allows current and future groups of patients to be analyzed. All data is stored in a memory bank for later examination by anyone concerned. Computer methods will enable correlation of anatomical deformities with functional deficiencies.

Communication is imperative for proper orientation, continued interest, and active feedback. Short form questionnaires provide continuous sampling of progress. Periodic newsletters help to keep in touch.

The scope of the field clinics is international. There are 267 clinics—171 in the United States and ninety-six in Canada, Europe, South America, the Middle East and Asia.

Inadequate data sheets and straying from treatment guidelines can make retrieved information ineligible for computer analysis.

A field clinic may be established to use scientific methods to solve controversial problems in areas that are difficult to investigate without a large series of cases. The authors are pleased with this method and think it particularly useful in evaluating many orthopaedic disabilities; they recommend its use.

The Sinogram as a Diagnostic Aid. COLONEL JOHN E. BANCROFT¹⁰⁵, MAJOR JACK K. TIP-PENS¹⁰⁶, and LIEUTENANT COLONEL HERBERT H. GAMBER¹⁰⁷ presented an exhibit consisting of photographs of selected patients with chronic draining sinuses that were well outlined by wound

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105. Letterman General Hospital, San Francisco, California 94129.

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107. Letterman General Hospital, San Francisco, California 94129.

sinography. Examples of the delineation of the extent of involvement and subsequent surgical treatment based on the sinograms seen on roentgenograms were included. Many of the patients were casualties from Viet Nam with multiple war wounds. A brief analysis of forty cases was outlined.

Use of Kiel Bone in the Anterior Interbody Fusion of the Cervical Spine. DR. GEORGE TRUCHLY and DR. KIM POON TAM, New York, N.Y.

Finger-Tip Amputations—A Short Cut to Success. DR. CHARLES E. VIRGIN¹⁰⁸, DR. JOHN J. FAHEY¹⁰⁹, DR. CLIFFORD C. RAISBECK, JR.¹¹⁰, and DR. DONALD J. MAYLAHN¹¹¹. Technical advances in orthopaedic, plastic, and reconstructive surgery have obscured an earlier and simpler method often used in the management of traumatic finger-tip amputations. Based on the observable fact that the regenerative capacity of the finger tip is considerably greater than might be expected and on the results of 202 consecutive cases, the following outline of treatment was presented:

Amputations distal to the nail root are initially treated by débridement—not revision—of dead devitalized tissue, elective resection of protruding bone, and tetanus prophylaxis. Following hemostasis by elevation and compression, a sterile vaseline gauze dressing is applied and changed within forty-eight hours. Successive dressings of vaseline or zinc oxide and gauze are changed at least every five days, and minor wound toilet is performed to prevent the accumulation of material beneath a crust. Patients may return to light work in seven days, when comfortable. Full skin closure is usually obtained in four to six weeks in adults.

It was the exhibitors' feeling that, in the face of a multitude of complications offered by split thickness grafts, full thickness grafts, shortening and primary closure, Kutler method, advancement of a volar flap, and various pedicle flaps, the method presented offers a simple, easy, and quick method that provides for excellent closure with recovery of sensation, avoids hospitalization and allows early return to work, and avoids surgical complications and secondary procedures. Contrary opinion must face the excellent results in the 202 cases presented. In children, especially, physical and psychogenic trauma are avoided with superior results. In adults the results are at least equivalent to the best of other methods and are often superior. Examples of cases were displayed and a summary of the 202 patients was presented. They all had good return of function, sensation, and cosmetically acceptable full thickness finger-tip skin. This method of treatment was found particularly valuable in young children; in older children and adults, the Moberg operation should be considered when the distal end of the thumb is involved.

Acrosyndactyly. DR. ROBERT J. WALSH, Chicago, Illinois.

Heterotopic Ossification and Ankylosis in the Paralyzed Patient. DR. GEORGE W. WHARTON¹¹², DR. T. H. MORGAN¹¹³, DR. FRANKLYN C. STEWARD¹¹⁴, and DR. ROBERT E. CRANLEY¹¹⁵. Heterotopic ossification can be detected roentgenographically in approximately 20 per cent of patients with traumatic spinal-cord injuries. The authors found that approximately one-fourth of the affected patients suffer significant impairment of joint function as a result of this complication. Paralyzed patients with ankylosis of major joints or severe limitation of joint motion are severely limited in their rehabilitation potential.

A series of roentgenograms and photographs was presented to illustrate the problem and the manner in which the patients are impaired. The authors have most frequently encountered restriction of hip motion as the presenting problem when heterotopic ossification occurs. This limits the patient's sitting ability, places excessive strain on the lumbar spine, and may increase the tendency for pressure sores to occur.

A second series of roentgenograms demonstrated the effectiveness of passive joint movement in avoiding the consequences of heterotopic ossification around the hip joints. Where possible, continuous passive joint movement while heterotopic ossification is forming has led to the development of pseudarthroses in the heterotopic bone mass through which a functionally normal range of joint motion can occur.

Surgical and biopsy specimens were presented photographically at intervals in the maturation

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process. The extreme vascularity of the heterotopic bone during the first seven to twelve months after onset was demonstrated. In contrast, specimens obtained from patients five years or more after the onset of heterotopic ossification demonstrated the appearance of mature lamellar bone with normal vascular supply.

The exhibit concluded with a series of sketches in which the authors' recommendations for limited surgical resections were given. The authors stressed the importance of avoiding surgery until maturation of the heterotopic bone was complete. A normal alkaline phosphatase level, clearly defined heterotopic bone margins and linear bone trabeculations on roentgenograms, accompanied by documentation of twelve months or more after the onset of heterotopic bone formation, were the criteria set forth by the authors for maturity.

Septic Dislocation of the Hip in Infants. DR. THOMAS E. WHITESIDES ¹¹⁶ and DR. HARRY SHUFFLEBARGER ¹¹⁷. Septic dislocation of the hip is the result of unrecognized or inadequately treated septic arthritis. Only one of thirty-three reported cases in the past achieved a satisfactory result. Seven septic dislocations occurred following femoral puncture in the premature nursery during a period of difficulty with *Staphylococcus aureus* in 1961 at Grady Memorial Hospital, Atlanta, Georgia. Orthopaedic treatment was instituted on consultation on the average of four weeks after the onset of fever. Five of the patients were available for follow-up examination nine years after onset. One normal hip, three satisfactory hips (good motion, no pain, and excellent bone structure for reconstruction if needed), and one poor hip (patient's family discontinued therapy after nine weeks) resulted from a regimen of therapy which included posterior open drainage, traction, reduction, cast immobilization for eight to twelve weeks, prolonged abduction splinting allowing motion in abduction for from eight months to four and one-half years, and subtrochanteric and pelvic osteotomy as needed. Femoral puncture technique should not include entrance into the hip joint, and early diagnosis and appropriate treatment of septic arthritis of the hip should enable one to avoid this tragic state.

Amputation by Ankle Disarticulation. DR. M. C. WILBER ¹¹⁸, and DR. L. W. WILLETT, JR. ¹¹⁹. When deletion of the fore part of the foot is indicated due to severe trauma, infection, or peripheral vascular disease, amputation by ankle disarticulation rather than a Syme amputation should be considered. The advantages of an ankle disarticulation procedure are:

1. Presence of an open wound of the foot does not contraindicate the procedure.
2. Procedure is useful in patients with peripheral vascular disease.
3. Operative technique requires only average technical skill.
4. Less postoperative care is required.
5. Fewer complications
6. Provides a comfortable, weight-bearing stump.

Ten fixed color transparencies outlined the operative procedure which was illustrated in detail by a narrated sound-slide program.

Since 1967, a series of twenty-one consecutive ankle disarticulations performed at the Naval Hospital, Philadelphia, Pennsylvania, provided the data for the exhibit. Minimum follow-up was one year and maximum follow-up was three years and eight months. Only one amputation had to be revised to a Syme level amputation due to difficulty with the malleoli in the prosthesis.

Arthrography and Total Hip Replacement. DR. PHILIP D. WILSON, JR. ¹²⁰, DR. ROBERT FREIBERGER ¹²¹, and DR. EDUARDO A. SALVATI ¹²². Arthrography in patients with persistent pain after total hip replacement has proved useful for the diagnosis of loosening, soft-tissue abscesses, sinuses, and other abnormal configurations or communications of the intracapsular space. Definite diagnosis of these complications is not always possible by clinical, laboratory, and conventional roentgenographic techniques. Even fluoroscopy and cineroentgenography usually fail to provide conclusive information.

With a well seated prosthesis, the contrast agent injected intra-articularly fills an irregular space and no radiopaque liquid is seen between the acrylic-bone interface. When loosening is present the contrast agent seeps in the interface and a radiopaque space is demonstrated. This is frequently seen on arthrograms made with traction applied to the lower extremity.

Interpretation of the arthrogram is more difficult in cases in which radiopaque acrylic cement

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is used, due to the superimposition of the two radiopaque images. A narrow radiolucent line which does not fill with the contrast agent is often seen in the asymptomatic hip. Unless it widens on serial examinations, it has no clinical significance.

Reliability of arthrography in our experience has been high; while a normal arthrogram does not definitely rule out the presence of a complication, a positive arthrogram appears to be diagnostic.

Dislocation of the Hip Complicated by Medial Fracture of the Femoral Head. DR. SYDNEY H. YARBROUGH, Atlanta, Georgia.

Removal of the Posterior Horn of the Meniscus using Pituitary Rongeur. DR. BASILIUS ZARICZNYJ¹²³ presented surgical technique of removal of the posterior horn of the medial meniscus, and in some cases of the lateral meniscus, using pituitary rongeur in order to avoid making a second posteromedial or posterolateral incision.

One hundred and forty-three meniscectomies done in 141 patients during the last four years were reviewed. In all of these patients, the pituitary rongeur was used. The medial meniscus was removed in 116 knees and lateral in thirty-four cases. The lateral meniscus was removed through a medial parapatellar incision in twenty-one knees; through the second posterolateral incision in six knees; and through the lateral incision in seven knees.

The leg is prepared and draped in the usual manner and is held in about 30 degrees of flexion by putting two sheets underneath the knee. If more flexion or valgus stress is desired, the leg is positioned over the edge of the operating room table. The meniscus is removed in the usual manner. Removal of the joint capsule with the meniscus is avoided by dissecting the meniscus as far posteriorly as possible with Metzenbaum scissors. The posterior portion is detached with a meniscectomy knife. After this, the meniscus is displaced in the intercondylar notch, the knee is bent to 90 degrees, and the posterior horn of the meniscus is cut using the meniscectomy chisel.

Any remaining portion of the meniscus is removed using the pituitary rongeur. The posterior horn of the medial meniscus can be approached medially by bending the knee to about 20 to 30 degrees and applying valgus stress. This opens the joint enough so that the posterior horn of the meniscus can be removed easily under direct vision. The other approach to the posterior horn is through the intercondylar notch. This is accomplished by bending the knee to 90 degrees and applying gentle traction.

In order to visualize the lateral meniscus, the knee is flexed and the hip is abducted and externally rotated as in Patrick's test. After retracting the fat pad, the anterior, lateral, and sometimes posterior portion of the lateral meniscus could be seen. Since in most of the knees lesions, such as chondromalacia (seventy-two knees), arthritic changes (forty-three knees), torn ligaments (twenty-nine knees), loose bodies, chronic synovitis, or cysts were found in addition to the torn meniscus, a medial parapatellar incision long enough for complete inspection of the knee joint was used.

The pituitary rongeur was also used for removal of small pieces of damaged cartilage on the femur or the tibia and for removal of synovial folds.

The advantages of using the pituitary rongeur were: (1) shortening of the operating time, (2) less trauma to the tissue, (3) no damage or weakening of the posteromedial portion of the medial capsular ligament of the knee joint.

A fine straight or curved rongeur with narrow jaw and the long handle was used in the past. Since sometimes the rongeur is not strong enough for cutting a healthy, recently torn meniscus, a new rongeur is being devised.

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