

Staff Meeting Bulletin  
Hospitals of the » » »  
University of Minnesota



Fracture of  
Neck of Femur

STAFF MEETING BULLETIN  
HOSPITALS OF THE . . .  
UNIVERSITY OF MINNESOTA

Volume XVIII

Friday, April 11, 1947

Number 22

INDEX

	<u>PAGE</u>
I. CALENDAR OF EVENTS . . . . .	368 - 370
II. PRINCIPLES OF TREATMENT IN FRACTURE OF THE NECK OF THE FEMUR . . . . .	
. . . . . H. B. Hall and D. R. Lannin . . . . .	371 - 374
III. GOSSIP . . . . .	375

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William A. O'Brien, M.D.

I.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL  
CALENDAR OF EVENTS

April 14 - April 19, 1947

No. 153Monday, April 14

- 9:00 - 9:50 Roentgenology-Medicine Conference; L. G. Rigler, C. J. Watson and Staff; Todd Amphitheater, U. H.
- 9:00 - 10:50 Obstetrics and Gynecology Conference; L. J. McKelvey and Staff; Interns' Quarters, U. H.
- 10:00 - 12:00 Neurology Ward Rounds; A. B. Baker and Staff; Station 50, U. H.
- 11:00 - 11:50 Roentgenology-Medicine Conference; Veterans' Hospital.
- 11:00 - 11:50 Physical Medicine Conference; Cerebro-vascular accidents; Joseph E. Maschmeyer; W-200, U. H.
- 12:15 - 1:15 Obstetrics and Gynecology Journal Club; M-435, U. H.
- 12:30 - 1:20 Pathology Seminar; Sarcoidosis; Henry E. Michelson; 104 I. A.
- 12:15 - 1:30 Pediatrics Seminar; Social resources favorable to the Minnesota children; JoeAnne Kramer; 6th Floor Seminar Room; Eustis Amphitheater, U. H.
- 12:30 - 1:30 Physiology Seminar; Psychosomatic aspects of lactation; W. E. Petersen; 214 M. H.
- 4:00 - School of Public Health Seminar; Is tuberculosis nursing becoming a rural problem? Allen Koplin; 113 MeS.
- 8:00 - Clinical Research Club; Speakers - John Wild (Dept. of Surgery) and J. E. Gillam (Dept. of Obstetrics); Eustis Amphitheater, U. H.

Tuesday, April 15

- 9:00 - 9:50 Roentgenology-Pediatrics Conference; L. G. Rigler, I. McQuarrie and Staff; Eustis Amphitheater, U. H.
- 10:30 - 11:30 Surgery Seminar; John R. Paine; Small Conference Room, Bldg. I., Veterans' Hospital.
- 12:30 - 1:20 Pathology Conference; Autopsies; Pathology Staff; 102 I. A.
- 2:00 - 2:50 Dermatology and Syphilology; H. E. Michelson and Staff; Veterans' Hospital, Bldg. III.
- 3:15 - 4:15 Gynecology Chart Conference; J. L. McKelvey and Staff; Station 54, U. H.

- 3:30 - 4:20 Clinical Pathological Conference; Veterans' Hospital.
- 3:45 - 4:50 Pediatrics Staff Rounds; I. McQuarrie and Staff; W-205, U. H.
- 4:00 - 4:50 Surgery-Physiology Conference; Pancreatitis; Tague C. Chisholm; Eustis Amphitheater, U. H.
- 5:00 - 5:50 Roentgenology Diagnosis Conference; At General Hospital.
- 8:15 - Fourteenth Address of E. Starr Judd Lectureship in Surgery; Changing Concepts in Surgical Care; I. S. Ravdin; Museum of Natural History Auditorium.

Wednesday, April 16

- 8:00 - 8:50 Surgery Journal Club; O. H. Wangensteen and Staff; M-515, U. H.
- 8:30 - 10:00 Psychiatry and Neurology Seminar; Staff; Station 60 Lounge, U. H.
- 11:00 - 11:50 Pathology-Medicine-Surgery Conference; Cor pulmonale; E. T. Bell, C. J. Watson, O. H. Wangensteen and Staff; Todd Amphitheater, U. H.
- 12:00 - 1:00 Physiological Chemistry Journal Club; Staff; 113 MeS.
- 4:00 - 6:00 Medicine and Pediatrics Infectious Disease Rounds; W-205, U. H.

Thursday, April 17

- 8:30 - 9:20 Surgery Grand Rounds; John R. Paine and Staff; Veterans' Hospital.
- 9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; Todd Amphitheater, U. H.
- 10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 10:30 - 11:20 Roentgenology-Surgery Conference; Staff; Veterans' Hospital.
- 12:00 - 12:50 Physiological Chemistry Seminar; Lipid Metabolism; Walter O. Lundberg; 214 M. H.
- 4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hansen and Staff; E-534, U. H.
- 4:00 - 4:50 Bacteriology Seminar; The role of blood groups in transfusion reaction in erythroblastosis foetalis; Ruth Bailin; 214 M. H.
- 5:00 - 5:50 Roentgenology Seminar; Case presentations; Harold O. Peterson and Stanley C. Peterson; M-515, U. H.
- 7:30 - Physical Medicine Seminar; William G. Kubicek; 111 MeS.

Friday, April 18

- 9:00 - 9:50 Medicine Grand Rounds; C. J. Watson and Staff; Todd Amphitheater, U.H.
- 9:00 - 9:50 Pediatric Grand Rounds; I. McQuarrie and Staff; Eustis Amphitheater.
- 10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 10:30 - 11:20 Medicine Grand Rounds; Veterans' Hospital.
- 10:30 - 12:20 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Otolaryngology Department; U. H.
- 11:30 - 1:00 University of Minnesota Hospitals General Staff Meeting; Newer Obstetric Analgesics; Curtis J. Lund; New Powell Hall Amphitheater.
- 1:00 - 1:50 Dermatology and Syphilology; Presentation of Selected Cases of the Week; H. E. Michelson and Staff; W-312, U. H.
- 1:00 - 2:50 Roentgenology-Neurosurgery Conference; O. H. Wangenstein, L. G. Rigler, and Staff; Todd Amphitheater, U. H.

Saturday, April 19

- 7:45 - 8:50 Orthopedics Conference; Wallace H. Cole and Staff; Station 21, U. H.
- 9:00 - 10:00 Neurology Grand Rounds; A. B. Baker and Staff; Station 50, U. H.
- 9:00 - 9:50 Surgery-Roentgenology Conference; O. H. Wangenstein, L. G. Rigler, and Staff; Todd Amphitheater, U. H.
- 9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; M-515, U. H.
- 10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; M-515, U. H.
- 10:00 - 12:50 Obstetrics and Gynecology Grand Rounds; J. L. McKelvey and Staff; Station 44, U. H.
- 11:00 - 12:20 Anatomy Seminar; The history of neurological institutes; A. T. Rasmussen; and, Some methodological advances in neuroanatomy; Berry Campbell; 226 I. A.

## II. PRINCIPLES OF TREATMENT IN FRACTURE OF THE NECK OF THE FEMUR

H. B. Hall  
D. R. Lannin

Fracture of the neck of the femur and reconstruction of the hip following non-union of the fracture is, today, one of the major problems of orthopedic surgery. This fracture occurs most commonly in persons over fifty. Because of its incidence in this age group, and the increasing proportion of the geriatric group in our population, this problem has increased significance.

Fracture of the femoral neck may occur from a rather trivial external strain or to no apparent external strain at all. Many patients, on close questioning after a fall, remember that they had a pain in the hip followed by a fall, and that the fall itself did not produce the injury. Many fractures attributed to a fall may be really caused by abnormal internal strain resulting from muscular pull during the misstep, and not by direct trauma of the fall.

In general, femoral neck fractures may be divided into the abduction, and the adduction types. Abduction fractures are always subcapital, and the fragments are partially impacted in the upper and lateral aspect. Adduction fractures may be at any level. It is very important to recognize and differentiate these types as their treatment and prognosis is markedly different. In an abduction fracture, the weight bearing line of force, and the line of force of the strongest muscle pull, tend to further impact the fracture. The prognosis for union, if the lateral x-ray shows minimal or no displacement, is very good with conservative treatment. The patient usually is kept in bed with only light traction, and with restriction of motion for a short time, and then allowed to be up without weight bearing. Any initial period of bed rest is only for the comfort of the patient, and is not otherwise necessary.

In the adduction type of fracture, the lines of force of muscle pull and weight bearing tend to produce a shearing strain through the fracture line, and

some type of adequate immobilization must be employed.

Pauwels has differentiated the types of fracture by the angle of the plane of the fracture. What is spoken of as Pauwels' angle is the angle between the line of fracture, and a horizontal line drawn through the anterior superior iliac crests. In general, those fractures having a Pauwels' angle of thirty degrees or less, if there is minimal or no displacement on the lateral x-rays, may be considered satisfactory for conservative treatment. Those cases having an angle over 30° need some type of internal fixation, and the greater the angle, the greater the shearing strain and chance of non-union. It is in these high angle fractures that primary osteotomy might be considered. Motion caused by the shearing strain, and motion at the fracture site, produces hyperaemic decalcification, and, if allowed to continue, the neck gradually absorbs and non-union occurs. Some type of fixation is necessary. No attempt will be made to discuss any type of fixation except that of internal fixation with some mechanical device. The most common type now used for intracapsular fractures is the three flanged Smith-Peterson nail. Other internal fixation devices are the Moore multiple pins, the Henderson leg screw, and the large wood type screws. The advantages of early joint motion, early ambulation and solid fixation are so great that few adduction fractures are now treated by other methods unless there is some definite contraindication to a surgical procedure.

Any type of internal fixation is a difficult technical procedure, and the results depend a great deal on the skill of the surgeon. Eric Lloyd has said, "The bad results of hip nailing are the results of bad nailing." A 100% perfect result cannot be expected from a procedure that is only 80% perfect technically. All the criteria for a successful result must be met if a solidly united, nearly normal functioning hip is to be expected. Not only is surgical perfection necessary, but the technical physical set-up must be adequate. For satisfactory extra capsular nailing x-ray control from both the anteroposterior

and lateral planes is nearly an absolute necessity.

There is no definite period when weight bearing may be started. The best rule is to allow weight bearing only when there is radiographic evidence of solid bony union.

Intertrochanteric and pertrochanteric fractures are now generally fixed with some type of internal fixation having an additional basic plate down the lateral aspect of the upper femur, such as the Moore, Blount or Moe plate. Each method requires the same care and adherence to basic principles for good end results.

Inadequate reduction as a cause of non-union is usually associated with improper fixation as there is not enough of the fracture surfaces in apposition to allow adequate transfixation. In our cases requiring reconstruction, where improper fixation has been the contributing cause of non-union, a fairly large percentage had attempted fixation by some wholly inadequate form of stabilization. Some cases were seen with a single, short screw, or two poorly placed screws or Kirschner wires, or with simple nails. The rest have been improperly fixed with the Smith-Peterson nail. In these latter cases, the most common mistakes have been the case of too short a nail that pulled out of the head, too long a nail that either penetrated the articular cartilage or did not allow impaction of the fragments, or a marginally placed nail that cut out of the side of the neck. These same faults of placement have been found in the blade plate type of fixation of the intertrochanteric fractures. A few cases have had too early weight bearing, or have had a fall before union occurred and have had a break of the nail or blade plate. Union must be solid before weight bearing begins as the metal itself will not bear the weight alone, but will eventually break.

Other complications which may lead to later reconstruction are sepsis following internal fixation necessitating the removal of the metal, and avascular necrosis of the femoral head. This avascular necrosis may appear late, in fact, it may appear after the fracture itself has firmly united. Much of the

blame for the avascular necrosis has been placed on the operative fixation with the reasoning that the blood supply is interrupted, particularly if the capsule is opened during operative fixation. This is not always the cause as avascular necrosis appears in abduction fractures that are not surgically treated. Necrosis is more likely caused by interference with the blood supply of the femoral head at the time of the original injury.

In some cases with pathological fractures with no displacement, and fissure fractures following radiation therapy, good union has been secured by using tibial or fibular grafts. In these cases there has been no marked displacement of the fragments, and immobilization in plaster had been necessary for only a limited period. These grafts have also been used in cases of partial union where increased strength is required.

If non-union has occurred and hopes of obtaining a fairly normal hip have been abandoned, some type of reconstruction must be attempted. This operation aims to produce a stable, painless hip that will allow weight bearing and a fair amount of activity. The type of reconstruction depends largely on the amount of neck remaining, and the viability of the head. In cases with severe primary fragmentation of the head, or with a definitely dead head, but with a sufficient amount of remaining neck, a Whitman type reconstruction is fairly successful. In such cases the head is removed and the neck is implanted into the acetabulum to become the weight bearing surface. The greater trochanter, with the abductor muscles, are removed and displaced downward on the lateral surface of the femur as far as possible to give increased lateral stability. The main disadvantages of this procedure are increased shortening with only fair stability, occasional pain, and, rarely, dislocation of the neck.

Another similar operation is the Colonna Operation in which the head is removed, the abductor muscles are stripped off the trochanter, and dis-

placed downward on the shaft utilizing the greater trochanter in the acetabulum as the weight bearing surface. This procedure gives slightly more shortening than the Whitman, with resulting limp, and abduction of the leg, but the stability is probably better. Albee removed the head, and from it shaped a wedge. He then placed the neck of the femur in the acetabulum, performed a bifurcation osteotomy through the region of the greater trochanter, and forced the wedge into the bifurcation. The wedge holds the abductors tight in a more lateral position, and by changing the leverage maintains the abductor tension. Campbell removed the head, and cut a thick graft from it. He then removed the greater trochanter with its muscular attachments, and placed the neck in the acetabulum. The trochanter was displaced downward as much as possible, and attached with the bone graft to the shaft by screw or pin fixation. Both the Albee and Campbell procedures have the disadvantage that the graft cut from the dead head has to revascularize and unite. This means a longer period of immobilization, and neither procedure has any marked superiority over the Whitman or the Colonna.

If the head seems viable it is, of course, an advantage to utilize the articular surface of the head as the weight bearing surface. Brackett cleaned out the fracture surface of the head, and "freshened" the neck and forced it into the raw surface of the head. The trochanter, with the abductors, was again inferiorly displaced and re-secured. Luck modified this in that he removed a wedge from the intertrochanteric area of the femur and forced the shaft medially so that the weight bearing thrust was directly under the head. He then displaced the trochanter downward, and held both the trochanter and the head to the shaft with a single pin. Both of these procedures have the disadvantage that the viability of the head is always questionable, and if an avascular necrosis of the head develops, a poor result is almost certain. There is not only the chance of a late necrosis from the trauma of the original injury, but also these operative procedures are technically difficult, and all require external fixation by a plaster cast.

A simpler, and less extensive, extra-articular procedure that has many advantages is a simple osteotomy at the approximate level of the lesser trochanter, with abduction of the leg and as medial displacement of the shaft under the head as possible. This procedure brings the weight bearing line directly under the head, and actually changes an adduction into an abduction type fracture. Another advantage of this method is that if the head remains viable and union results, a good functional hip results. If the blood supply of the head proves to be insufficient, and avascular necrosis develops and non-union results, a good arthroplasty with a fairly satisfactory hip remains. Internal fixation with either a double angle blade or with a Moe plate plus the advantages of early ambulation and early joint motion is preferable. However, one requisite for this internal fixation that is not always present is that the fragments of the head and trochanteric section be of good solid bone. In patients with thin osteoporotic bone, or where the neck and trochanteric section have been weakened by former attempts at fixation, there is a danger of the bone splitting, and the blade or screws cutting out. In these cases a post-operative spica for a short period is necessary. At the time of the osteotomy, if the bone seems very thin, or if the trochanteric fragment is comminuted, no internal fixation is attempted, but the patient is placed in a spica for six to eight weeks. Because of the advantages of the simple osteotomy, especially because it is adaptable to so many conditions and fracture levels, it is now the procedure of choice in most cases. This method was first described by Lorenz and popularized recently by McMurray.

Because of the general reports of low percentages of union by internal fixation, the question has arisen if, in the long run, would it not be time-saving to perform an osteotomy at the time of the original fracture. This work is in the experimental stage, and not enough time has elapsed to draw a definite conclusion as to its value. The object is, of course, to secure a

greater percentage of union. The disadvantage is that as an end result all the hips are abnormal. Perhaps after trial for a longer period definite indications for primary osteotomy will be established.

We have not made any attempt to tabulate the end results in the different types of reconstructions. About sixty cases have been reviewed, and the end results vary much more from patient to patient than between types of reconstructions. Satisfaction with the end result depends largely on what was expected. Sometimes what is a good result to the surgeon may not be as much as the patient had hoped for. On the other hand, many patients get around well with no complaints with an end result that, at least from the standpoint of physical examination and x-ray, is not up to the surgeon's expectations. In general, the hips are stable, and weight bearing is usually possible. Most patients walk for short distances, as around the house unaided, but require a cane or other support for longer distances. The main complaint is tiring and aching pain on over-exertion. Walking long distances usually require rest periods. Considering that the age of these patients is nearly always in the seventies and eighties, the reconstructions are satisfactory for most activities in which they desire to engage. These late years of relative comfort are much appreciated, and the few months of disability during the reconstruction are minimal compared with the miseries of an ununited, unstable hip.

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III. GOSSIP

Child Welfare Chairmen of the American Legion, the American Legion Auxiliary, and the 40 and 8, are attending a two-day course in Rheumatic Fever and Child Welfare at the Center for Continuation Study today and tomorrow. It is estimated that 2 per cent of school children in our country have heart disease as the result of rheumatic fever. Ninety-eight per cent of all heart disease in patients under 20 years of age is caused by rheumatic fever and from 40 to 70 per cent of all rejects of young men for military service because of heart disease were for rheumatic fever. The Child Welfare Chairmen under the leadership of Dr. L. R. Richdorf of our Pediatric staff are conducting a drive among their members and the citizens of Minnesota for a \$500,000 fund for a research professorship in rheumatic fever at the University of <sup>M</sup>innesota. Everyone wishes them well in their splendid undertaking and the two-day course at the Center is being given to help them visualize the problem ahead. Today the theme is Rheumatic Fever. Tomorrow it is Character Building Agencies, the Legion's program in Child Welfare, and the General Aspects of Child Care...The Columbia Broadcasting System through its Special Events Department broadcast a program entitled "A Long Life and A Merry One", Friday, April 4, 9 to 10 p.m. It resembled a similar presentation on Juvenile Delinquency made about a month ago. The opener was a hospital scene in which a baby was receiving exsanguenation transfusions for Rh factor disease, but, the narrator went on, "this type of medical service is not available to everyone." Next, there was a series of dramatizations with connecting musical links which portrayed a poor school teacher trying to teach health under unsatisfactory conditions, a woman went home from the hospital on the fourth postpartum day without any provision for her care, a woman working as a chambermaid in a hotel whose husband had spent all their money going from one private physician to another for a headache until a brain tumor was found, a woman beside a new concrete road trying to stop a car to ask for a doctor to come out from the village for her sick child, an old man whose family had bought him a new suit of

clothes as a present, disregarding the pain in his stomach which was from cancer (in an aside, the narrator told us he probably would wear the suit in his casket), an older doctor complaining that no young doctor was coming to relieve him and that he was tired and wanted to rest, and many more like this. In the end we learned that some people believe nothing further should be done; others felt that through cooperation we could hire medical service, or we could prepay our bills, or the government could take over the whole program. The hour was full of emotion, but failed to be fair because it included under the term "sickness" social and economic problems, habits of the people, false pride, failure to realize there is a period of reconversion in medicine as in other fields, and the naive assumption that the problem is a simple one, that nothing is being done, and all we need is to put it under a federal department and get an appropriation. The reply to the broadcast as far as Minnesota is concerned will be made tonight at 9:30 p.m. over WCCO by Ruth E. Boynton, R. M. Amberg, H. S. Diehl, Donald W. Hastings, a representative of the Minnesota State Medical Association, and yours truly. It is not wise to "debate" an issue, when a week elapses between one side's presentation and the other, so we plan to present in a positive way the developments which are taking place in Minnesota to improve medical and health care for all our people...Medical veterans are back at the Center on their last lap with a group of regular Army medical officers making a distinct contribution. Albert M. Snell, Mayo Clinic, was a Center visitor this week. Al is as effective as ever in presenting his material, but this time he sported a watch given to him by an admirer, which not only gives the hour and minutes, but also is a stop watch and a calendar. In fact the only thing it doesn't have on it is a bell to ring for the time to change the slides on the screen...Next week will be outstanding at Minnesota with I. Ravdin discussing "Changing Concepts of Surgical Care" in Museum of Nat. Hist., Tuesday, April 15, 8:15 p.m., and Bernard Zondek speaking in the Medical Sciences Amphitheater, Friday, April 18 on "The Mechanism of Action and Inactivation of the Estrogenic Hormone....."