

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

**Osteotomy**

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

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Volume X

Friday, February 24, 1939

Number 18

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Published for the General Staff Meeting each week  
during the school year, October to May, inclusive.

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William A. O'Brien, M.D.

I. LAST WEEK

Date: February 17, 1939  
Place: Recreation Room  
 Powell Hall  
Time: 12:15 to 1:20  
Program: Movie: "How to Read"

Announcements

Meningitis  
 W. S. Sako

Discussion  
 E. S. Platou  
 Wesley Spink  
 Milan Novak  
 W. S. Sako

Present: 137

Gertrude Gunn  
 Record Librarian

\* \* \* \*

II. MOVIE

Title: "Swamp Land"  
 A "Struggle to Live" Series film  
 Released by: R-K-O

\* \* \*

III. ANNOUNCEMENTS

1. GUESTS

The Medical Social Workers in attendance at the postgraduate course for Medical Social Workers at the Center for Continuation Study. Following staff meeting they will be taken on a tour of the University of Minnesota Hospitals to inspect recent therapeutic developments. At

4:00 there will be tea at the Center followed by the closing round table.

2. BABY

Dr. and Mrs. Clarence P. Truog announce the arrival of a baby son, born February 9th. Official weight - 7 pounds, 1½ ounces.

Congratulations!

3. FUTURE COURSES

At the Center for  
 Continuation Study

Nervous and Mental Diseases  
 March 13 to 18, 1939

Diseases and Injuries of Bones  
 and Joints  
 March 13 to 18, 1939

Diagnostic Roentgenology  
 March 27 to April 1, 1939

General Surgery  
 April 10 to 15, 1939

Diseases of Blood and Blood  
 Forming Organs  
 April 17 to 22, 1939

Obstetrics  
 May 1 to 6, 1939

Gastroenterology  
 May 8 to 13, 1939

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#### IV. OSTEOTOMY

Wallace H. Cole  
Stewart W. Shimonek  
Edward T. Evans

##### Definition

Osteotomy is "surgical cutting of a bone." When performed through an open incision it is called an open osteotomy while when done through a puncture wound it is termed a subcutaneous osteotomy. Although strictly speaking the word osteotomy should be confined to those operations which merely cut the bone across by a single incision, the removal of a wedge of bone to correct deformity which is in reality a resection has come to be called a wedge-osteotomy and should be considered as part of our subject. The single cut, regardless of direction, is usually referred to as a linear osteotomy and most of the very numerous modifications of the single straight cut come under this heading.

##### History

The history of the operation of osteotomy is very interesting but decidedly modern. All authorities seem to agree that the first osteotomy was done by Rhea Barton of Lancaster, Pa. in 1826 and certainly his work is the first recorded. The osteotomy was an open one and was performed transtrochanterically in an attempt to correct deformity of an ankylosed hip and at the same time to cause a non-union or "artificial joint" which is not, of course, the result desired in osteotomies as we understand them today. The successful outcome of this first case with definite motion means that a non-union developed at the site of osteotomy but does not class the case as an arthroplasty. On account of the sepsis which followed practically all operations at that time this work of Barton's was not accepted enthusiastically although sporadic cases were so treated. Samuel Gross in his System of Surgery described Barton's operation and states: "In 1844 Dr. Gurdon Buck of New York in a case of complete synostosis of the knee with the limb at a

right angle so modified and extended the procedure of Dr. Barton as to remove the condyles of the femur, the head of the tibia and the patella, in a wedge-shaped piece, thereby bringing the leg almost in a straight position." This seems to be one of the first times that a wedge-osteotomy was performed and it is interesting to observe that Gurdon Buck, whose name is so well known on account of his adhesive and weight and pulley traction, is credited with it by Dr. Gross.

On account of the suppuration following incised wounds, so-called subcutaneous operations were devised early and Delpech performed the first subcutaneous tenotomy in 1816, an operation later to be improved and popularized in 1831 by the German Surgeon Stromeyer whose name is now always associated with the operation. Hunter had shown that wounds which were not exposed to the air seldom became inflamed and the clinical experience of Stromeyer and the Frenchman Guerin increased the surgical interest in subcutaneous operations but it was not until 1852 that subcutaneous osteotomy was performed. Professor Langenbeck at that time used this method for ankylosis of the hip joint in poor position and also in a case of bony ankylosis of the knee joint. By 1854, when his observations were first published, other cases on which he had operated for rachitic deformity of the legs were added. The method used was to make a small cutaneous incision and through this to perforate the bone with a quarter inch drill. A very narrow sharp pointed saw was then introduced into the hole thus formed and the bone partly sawn across. The operation was completed by breaking the remaining portion of bone and straightening the extremity. Suppuration occurred in some but not all of the cases. Langenbeck made the following conclusions:

"1. Bones can be cut subcutaneously like tendons, muscles, etc.

"2. Bones should only be partially cut subcutaneously, the partial section being preferable to the complete

division.

3. Healing of subcutaneous section of bone will not take place as in simple fracture, for the reason that the drill and saw produce some powder, which acts like a foreign body, and therefore some suppuration will take place.

4. Subcutaneous section is indicated in deformity of bones and bony ankylosis, and where we can not rupture them, the bones being too solid."

Gross and other American Surgeons, notably Pancoast and Sayre, early adopted the subcutaneous method of performing osteotomy but in England it was apparently not until 1868 that the first operation of this character was performed. Stromeyer Little, the son of the Dr. Little who introduced subcutaneous tenotomy into England, performed the operation successfully on a flexed, ankylosed knee with a narrow chisel introduced through an incision one-third of an inch in length. The wound healed in six days and the patient was walking in five weeks.

In 1869 William Adams, in England, divided the neck of the femur subcutaneously with a small saw, for adduction and right angle flexion deformity of an ankylosed hip. An attempt was made to get non-union by early motion but bony ankylosis in a straight position resulted and this was expected in later cases.

Following this the operation soon became an established one and the introduction of Lister's antiseptic methods made it relatively safe. Adams found that the best cases for his femoral neck osteotomy were those of ankylosis due to "rheumatic or pyaemic" origin because there was no loss of bone structure and the neck of the femur preserves its integrity. In the so-called strumous cases where loss of bone and destruction of the joint was greater he recommended the osteotomy of Gant.

Mr. Frederick J. Gant in the 1870's called attention to the destructive pathology in some cases of hip-joint ankylosis and devised what he called the infratrochanteric operation of osteotomy

as an alternative subcutaneous procedure to Adam's operation above the trochanters. The first operation was in 1872 and the instruments used were a stout tenotomy knife, to make the small incision down to the bone, and a fine saw. A Mr. Maunder who became especially interested in subcutaneous osteotomy at this time preferred a chisel to a saw but otherwise did the Gant operation. His first case was in 1875.

In May, 1876 Ogston of Aberdeen devised a subcutaneous osteotomy of the lower end of the femur for knock-knee deformity and his name became connected with this procedure for a time both in Europe and America but was soon replaced by that of William Macewen of Glasgow whose classical operation for the relief of genu valgum by transverse incision through the lower femoral diaphysis was advanced at that time and described first in the literature in 1879. Macewen devised a graduated osteotome to cut the femur from the inner side and this type of instrument is still frequently used wherever osteotomies are done. The operation was performed through a one-half inch incision directly down to the bone, and in order not to have any unnecessary bleeding the incision had to be at the level of the upper border of the patella and about one-half inch anterior to the spine for the insertion of the adductor magnus tendon. In general the bone was cut about two-thirds of the way across and then carefully broken and straightened although in hard and brittle bones the osteotome had to be carried to the lateral cortex. Osteotomy from the lateral side was said to be non-mechanical and Macewen wrote that he could not see a single reason why the external aspect of the femur should be chosen and listed several grave disadvantages. Richard Barwell took exception to these teachings however and operated from the outside and felt that nature would fill in the wedge-shaped gap left when the deformity was straightened, a contention which was certainly true. He also felt that osteotomy should be done on the tibia as well as on the femur in cases of genu valgum and separated the two operations by about two

weeks.

Since that time many types of osteotomy have been devised, both subcutaneous and open, and the field has been so enlarged that the procedure is certainly now one of the basic orthopaedic operations. Many names have appeared in the literature in connection with the operation, among which must be mentioned in addition to those already given, Billroth, Hoffa, Helferich, Pels-Leusden, Lorenz and Schanz, the two latter having given their names very definitely to special procedures. Although subtrochanteric osteotomy had been done by several surgeons for old cases of congenital dislocation of the hip in order to better the gait and deformity, it was Lorenz who devised the new principle of bifurcation osteotomy with the object of placing the proximal end of the distal femoral fragment in the acetabulum in order to obtain skeletal weight bearing. He deserves full credit for this work which was published in 1919 and his name must go with the operation. Schanz of Dresden, at about this same time came out with his "deep subtrochanteric osteotomy" for these same cases, the principle being an osteotomy at the level of the tuberculum to preserve the position the proximal fragment of the femur takes when weight bearing or when in Trendelenburg's position.

Much more could be given about the history of osteotomies but when one realizes that at least 10 names are connected with various forms of this operative procedure in the treatment of hallux valgus alone, it is evident that time does not permit a full discussion.

### Instruments

The instruments used in performing an osteotomy are fundamentally not many but the various modifications have made the list a large one. In general they are as follows:

1. Chisel. A chisel is in all respects the same as that used by carpenters and cabinet makers and is an instrument bevelled on one side only near its end. It tends to travel in a curve.

2. Osteotome. Long slender steel wedge, the sides of which gradually approach each other without any sudden bevelling at the edge. Macewen's graduated osteotome is the most famous but Lorenz, Billroth, Mathieu, Reiner, Hoffa and many others have given their names to instruments.

3. Saws. Used for the first osteotomies as above described and frequently modified.

Narrow key-hole types  
Gigli or chain saws.  
Bow saw (Helferich, Bier, etc.)  
Motor saws, etc.

4. Drills. Single or multiple drill holes aid in directing osteotomy at times. Curved Gant, etc.

5. Special instruments devised by individuals but never generally used.

6. Various protractor-like instruments to measure the degree of correction desired at time of operation.

7. Pins, screws and nails: of special design to hold fragments in desired position after osteotomy. These, when used, are held by special clamps or directly by the plaster of Paris dressing itself.

### Varieties

1. Osteotomies for redressment or straightening of angulations or deformities.

Many types: Straight, curved, angulated, cupped, of special design, etc. Wedge-osteotomies are of this type.

2. Osteotomies for derotation.

This osteotomy is a transverse one followed by rotation of the distal fragment on the long axis of the bone. It is indicated in certain mal-united fractures, in some cases of talipes, in infantile paralysis where external rotation of the leg has occurred, in some cases of obstetrical paralysis

(Menciere's operations), etc.

### 3. Special osteotomies.

For leg lengthening  
 For leg shortening  
 For changing weight bearing  
 lines as in un-united frac-  
 tures of the hip.  
 Etc.

It is well to remember that in doing osteotomies one is dealing with a live, active tissue, especially in children and that a cabinet-maker's job is not necessary in order to get a perfect result. If the physiology of bone growth and regeneration is borne in mind the reason for this is readily seen. After all, a bone which has been osteotomized is only a broken bone and the excellent results we see daily in fractures without anatomical reposition of the fragments show that poor results should be almost unknown when the fractures, or osteotomies, are planned out ahead of time.

(There are many references to osteotomy in the literature and the historical part above is copied freely from articles in The British Medical Journal for 1879 and from various text books.)

(Ombredanne and Mathieu, Hoffa, Schanz, Vulpius and Stoffel, Taylor, Haglund, Potel, etc.)

W.H.C.

Osteotomies of the extremities are performed for several reasons. First, to correct deformity at the joint space following ankylosis. This may be accomplished through the joint space itself or the shaft above or below the joint may be elected. Second, to correct malunion following fracture. Third, to correct congenital or acquired deformity of the shaft of bones and fourth, to improve stability. This will be discussed under the section on hips.

#### Osteotomies performed on the humerus:

A high osteotomy is sometimes performed to correct abduction and rotation deformity in conjunction with cases of birth palsy. No such case has been done here, but have been performed a few times in

our hospitals for crippled children. Supracondylar osteotomies to correct malunion following supracondylar fracture are sometimes necessary. In the case done in this hospital a reverse carrying angle had resulted from a supracondylar fracture. The shaft was divided just above the condyles and the carrying angle restored.

#### In the forearm and wrist:

Osteotomies on the radius are usually done to correct malunion following fracture. Most commonly this is necessary following Colles fracture. The distal fragment lies posteriorly and the patient complains of weakness of the hand and loss of grip. Osteotomy is performed at the fracture site and the distal fragment is levered anteriorly, the gap thus created being filled with bone chips. Five such cases have been performed here with increased function resulting.

The grip of the hand is much stronger with wrist extended, and for this reason, ankylosis in position of drop wrist may necessitate correction. One such case has been done here, a wedge being removed from the carpus, the wrist then being extended and allowed to ankylose in the corrected position.

#### In the shaft of the femur:

The shaft of the femur may be deformed following fracture. In a case operated on here, there was marked lateral bowing in the middle third of the femur with excessive new bone foundation, although the x-ray gave the appearance of non-union at the fracture site. A wedge was removed laterally in this case, the femur straightened and an onlay graft applied.

Knock knees are usually corrected by a supra condylar osteotomy on the femur.

#### In the tibia:

Most of these cases are the result of rickets, but cases of congenital anterior bowing should be excluded because of the certainty of developing a pseud-arthritis in such cases. Bow legs are corrected with an osteotomy at

the site of greatest curvature. They should be slightly over corrected to obtain the best results. Six cases of osteotomy in bow legs were found in our records all of which were corrected through a tibial osteotomy. In cases of congenital club foot the foot sometimes remains internally rotated though the varus and equinus have been corrected. In such cases a rotation osteotomy may be necessary rotating the lower fragment to bring the foot into the midline. Four such cases have been done here. In cases of bimalleolar fracture a varus deformity may result from too much inversion of the ankle at the time of reduction, or an eversion may result from incomplete reduction of this or a typical Pott's fracture. The criterion should be accurate reposition of the mortise of the ankle joint intrinsically and in relation to the weight bearing line of the tibia, rather than inversion of the foot, as sometimes mistakenly stressed. In two cases operated on here osteotomy was performed above the medial malleolus for inversion deformity, the lower fragment being levered into mid-position and the gap filled with bone chips. For an eversion deformity or mal-united Pott's fracture a linear osteotomy of the fibula and a wedge-osteotomy of the tibia is necessary.

#### The foot:

In cases of club feet the varus position may become a fixed deformity where correction has not been accomplished. In these cases a wide wedge of bone is removed from the tarsus on the lateral side of the foot sufficient to allow the foot to be brought into the mid position. Four such cases have been done here, two of which were bilateral. In cases of hammer toe, correction is accomplished by removal of a wedge of bone which includes the involved joint. The toe is thus straightened and allowed to ankylose in the corrected position.

S.W.S.

#### OSTEOTOMY AT OR NEAR THE HIP

Osteotomy at or near the hip has various indications and, judging by its more recent applications, will undoubtedly have more indications in the future.

Its use strives for one of three end results. First, for the oldest and now seldom used object, the development of a pseud-arthritis for restoration of motion at the hip (as per the first osteotomy) or the development of motion at a relatively painless site. (As per Robert Jones' subtrochanteric osteotomy for non-union of the hip). Secondly, and most frequently, for the correction of deformity and the relief of static strain. Thirdly, and most recently, for the production of stability in functional position where instability is the result of the loss of leverage due to insecurity of the fulcrum.

(I) Osteotomy for the development of a pseud-arthritis is seldom used because today more stress is placed on stability. One may argue that modified hip arthroplasty as carried out on our service is in reality such a procedure, but classically the original osteotomy of Barton and the later osteotomy of Dr. Robert Jones referred to a subtrochanteric section in the one instance for ankylosis of the hip and in the other for painful non-union fracture of the neck of the femur. Modern teaching feels that newer procedures are better indicated.

(II) Deformity of the hip, if single, associated with static strain, in the presence of partial or complete ankylosis, always calls for correction if the patient's condition warrants. Occasionally this may be accomplished by traction or manipulation but frequently osteotomy is indicated. Such osteotomy may be at the site of ankylosis as through the joint, (Slide 1.), or through the trochanteric area by simple osteotomy, (Slide 2.), or by wedge osteotomy. The method chosen may be predicated upon local reasons as in the first instance where chronic osteomyelitis of the trochanteric area precluded other procedures. Simple subcutaneous osteotomy is perhaps the method of choice unless very accurate mathematical correction is called for.

In this respect one should recall

Sir Robert Jones dictums regarding the optimum positions for the correction of deformity and the production of apparent lengthening of the affected limb by abduction of the femoral shaft on the pelvis. (Slide 4, if desired)

Wedge osteotomy is anatomically and mathematically ideal though seldom necessary.

Inasmuch as the osteotomy is carried out through good bone, fixation in a plaster spica is necessary for three to four months followed by a period of rehabilitation to reestablish weight bearing and ambulation.

In the presence of ankylosis of the lumbar or lumbosacral area, this procedure should be carried out with caution because of possible development of aggravated back complaints.

Static strain is relieved because weight bearing is thrust into the pelvic girdle as an end result rather than upon the soft tissues of the pelvis, e.g., the gluteal muscles, as formerly.

(III) There are those cases of instability not otherwise overcome which may call for osteotomy in this area. For example, the symptom producing unreduced or irreducible congenital dislocation of the hip and the irreparable non-union fracture of the neck of the femur (central or basal) which produces instability and pain.

In congenital dislocation where shelving operation has produced a stability but in which deformity persists a relatively high osteotomy may be indicated but usually, irrespective of the presence of a shelf if pain or dysfunction are present, a Schantz osteotomy is of great value. This is in reality a modification of the Lorenz bifurcation in that it utilizes the principle of its end result, weight bearing against the side of the pelvis instead of tangential to the pelvic support. (Slide 5.).

The Schantz is a low osteotomy so placed that section is made opposite the

acetabulum or obturator foramen so that the proximal portion of the femur has a maximum support against the pelvis and yet retains its mobile functions.

In non-union of the neck of the femur, this paper will not discuss methods of repair but rather the utilization of osteotomy as a means of producing stability. You are all aware of the fact that tangential strain at the fracture site causes in many instances a persistence of the non-union and that as a result varying degrees by overriding and secondary symptoms ensue. Pain on weight bearing may be a prominent factor in such cases.

The indicated treatment is the production of stability, be it by Thomas ring calipre, various reconstructions or osteotomy directed toward functional, stable weight bearing.

We have recently utilized the so-called McMurray osteotomy in non-union fractured neck of the femur and on one occasion for a partial dislocation of the hip.

A word might be said regarding the development of the McMurray osteotomy. It is in reality a modification of the Lorenz bifurcation made at a higher level, that is opposite the acetabulum itself. The use of a wedge osteotomy in order to affect a transition of the weight bearing thrust from a tangential strain at the fracture site to a direct force through the fracture site has long been a procedure carried out in Continental clinics. The operation is, however, more time consuming, harder on the patient and requires a prolonged convalescent period. McMurray felt that simple shifting of the weight bearing into the acetabular region with the necessary adduction of the great trochanter so that the lines of force bisect the fracture line would accomplish the same end result. For this reason he proposed a modification of Lorenz's bifurcation in which a blunt diagonal osteotomy by the subcutaneous method was carried out at the acetabular level

and the proximal end of the distal fragment, that is the shaft, was forcefully placed beneath the head of the femur and thereby considerably beneath the acetabulum. Stability is thus accomplished with a minimum of operative trauma, and we are pleased to report with quite excellent post-operative results.

With the transition of the weight bearing line from a tangential strain to a bisecting force, even late union has been known to occur at the fracture site. We have performed seven such osteotomies here at the University with excellent results to date.

E.T.C.

V. GOSSIP

At the annual meeting of the Minnesota State Dental Association in the Minneapolis Auditorium this week, the model hospital exhibit of Dental Hygienist Marjorie Gormican of the University of Minnesota Hospitals' staff is attracting a great deal of attention. This unique project represents a labor of love with her father, who is an expert cabinet maker (avocation). In addition, she has told the dentists and hygienists of her famous toothbrush survey made on our incoming patients. The majority do not bring any brushes because they do not have any. Others cannot bring a brush because "it" belongs to the family. When the patients are asked to report, they are told to bring a toothbrush (routine hospital letter.). Some bring nail brushes, others milk bottle brushes, in fact, any old kind of a brush. When they go home, they are not only taught how to use a toothbrush, but they also take one with them. The Hospital supplies a very good brush which lasts quite a time. It is hoped that when it wears out they will get another from some source... Another of the friends of our patients that some of us do not know so well are the hospital librarians. These are the women who bring reading material to the patients. After the War, disabled soldiers were kept in various private hospitals (before the present Veterans' Hospitals were erected). Gratia Countryman, former librarian for Minneapolis, was sent some books for them that had been used for overseas soldiers. Other hospital patients, noticing that disabled veterans were getting reading material, wondered why they couldn't have the same service. A few hospital administrators asked for it and Miss Countryman saw the possibility of extending the service. She immediately secured funds from various sources for doing it, and today the service has grown until it covers practically all the hospitals in the larger Minnesota cities and all the state institutions. In Minnesota, this group of librarians is well-organized, as they now are in seven other states. Minnesota apparently has been an outstanding leader in this field of service to the sick. Next Fall these librarians will have their first postgraduate course at the Center for Continuation Study (with probable national attendance.) In addition to their

own members, they hope to interest city librarians in all places where hospitals are not yet supplied with this service. Some of their experiences are very interesting. Many of our patients are not accustomed to reading books. Most of them read a newspaper or periodical on the average of about once a week. Many of the men are embarrassed when asked if they want a book, so the expert librarian senses this before she asks the question. She may introduce the book question by innocently inquiring about where our patient has been in his travels. This gives her the clue when she learns which country he would like to visit, for out comes a book on Alaska or whatever country he has named. Most of our women patients read love stories - even the baby mothers. For this last group there is also temporary interest in how to take care of the baby. For many of the older women, there is religious reading. It is practically impossible to stump our librarians when asked for foreign language books. The nurses do a great deal of reading; the interns and fellows use the library very little (altho they are welcome to do so). The few interns and fellows who do come in are heavy readers of good material. Contrary to popular belief, the books which are circulated are late books, and not old-timers that someone has given to the hospital. Bibliotherapy is the science of book selection for the sick. Neuropsychiatrist, Gordon Kamman, is our bibliotherapist. (He has attained a national reputation in this regard.) Note the similar interest displayed today in the effect of music on the sick (see last week's issue of Time.). One of the fine services of our library is securing reference books for student nurses. Most hospital libraries are operated on a part-time basis from a General Library. All should have a roomy place similar to ours, and all need plenty of fresh reading stock. We circulate 40,000 volumes a year (highest hospital figure). Good library service helps the nurses because it makes the patients more contented. There is little doubt that the most popular person on our staff for young and old is the "book lady."