CJOS

Vol [2008] 2.1

Clinical Journal of Orthopaedic Surgery

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Bonefix.co.nz

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1.**TKR infection. Current Orthopaedics (2007) 21, 314–319**

It has been estimated that surgical treatment of infections following TKR requires 3–4 times the resources of the hospital and surgeon compared with a primary TKR and twice the resources of aseptic revision TKR.3

Treatment options are:

_1. Long-term antibiotics, _2. Open or arthroscopic debridement with retention of prosthesis, _3 One stage revision, _4. 2 stage revision, _5. Arthrodesis, _6. Resection arthroplasty, and _7. Amputation.

Types of infection

1.Superficial infection [The Centre forDisease Control (CDC]

The diagnosis of superficial infection is often unreliable; the reliability of the third criteria (Table 1) for superficial infection has been challenged recently because of low interobserver agreement, arising from the lack of objectivity in judging tenderness, redness, localised swelling and heat.5

2. Deep infection

Pain is the most common presenting symptom of an infection of a knee arthroplasty. Thus onset of pain different from preoperative pain should raise the suspicion of infection. It typically occurs while the patient is at rest or wakes the patient at night. It is usually not aggravated by weight-bearing, although component loosening giving rise to such pain may be a sequel of infection

Usually, fever during the first 5 days of the postoperative period is physiological due to the inflammatory process. Thus, **pyrexia** by itself in the absence of other features of infection does not warrant further investigation during this period.7

Even in the absence of infection, **the local temperature** around a newly replaced knee can remain elevated for up to 6 months postoperatively.

Serous discharge in the first few days following surgery should be addressed with caution. Persistent discharge from the wound beyond 7 days is a serious problem as a superficial discharge may often arise from a deep source of infection.

Investigations

Clinical suspicion of infection should be confirmed by investigation, which should initially include a full blood count, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) and plain radiographs.

Wound swabs are discouraged as they complicate the clinical situation by yielding skin contaminants.6 Empirical use of antibiotics is also condemned by many authors as it leads to multi-drugresistant infection and it may mask the clinical features of infection long enough to preclude the option of early debridement and prosthetic salvage.

CRP and ESR are non-specific inflammatory markers. Both may be elevated in inflammatory, infectious and neoplastic processes.10 CRP usually peaks between 5 and 7 days. following surgery and then gradually decreases. Any peak after this period should increase the suspicion of infection but it must be noted that it remains elevated for as long as 6 weeks in non-rheumatoid patients.

Spangehl et al. (1999) have observed that when both the measurements are normal i.e. ESR (o30 mm/h) and CRP (o10 mg/L), the probability of infection is 0.00; when both tests are positive,the probability of infection rises to 0.83.

Joint aspiration

When the inflammatory markers are elevated with a clinical suspicion of infection, formal joint aspiration is indicated to establish the diagnosis. Joint aspirate should be sent for Gram staining, and cultured for anaerobic and aerobicbacteriae and fungi. Gram staining has a sensitivity of as low as 12%, but a specificity of 98.8.4 The most common organisms reported are Staphylococcus(s) aureus, coagulase-negative Staphylococcus, methicillin-resistant S. aureus,S. epidermidis and Pseudomonas aeruginosa.1White cell count with the differential cell count should also be performed on the aspirate. A sensitivity of 75%,specificity of 96% and accuracy of 90% is noted with knee aspirates in diagnosing infection prior to revision.

Radionuclide imaging

Radioisotope scans are not particularly useful in the acute postoperative period.6 111In-labelled white blood cells in combination with 99mTc-sulphur colloid marrow imaging is superior to other scans in the assessment of infection in total joint replacement, with a reported sensitivity,specificity and accuracy of 100%, 91% and 95%, respectively

Some authors advocate cultures of the knee aspirate 4 weeks after stopping the antibiotics and before second stage re-implantation.26 We believe that this is unnecessary as a routine and should be restricted to those patients with a suspicion of persistent infection and in the presence of elevated inflammatory markers.

Antibiotic therapy

Empirical antibiotic treatment for suspected periprosthetic infection should be guided by the class of the infection and the findings of Gram-staining. Until final culture results are available, acute haematogenous infections should be treated initially with a combination of cefazolin and gentamicin. All chronic and acute post-operative infections with Grampositive bacteria and all cases in which a Gram stain fails to identify bacteria should be managed with vancomycin.Infections with Gram-negative bacteria should be managed with a third- or fourth-generation cephalosporin.

Long-term antibiotic suppression alone is an option in selected patients. This should be considered only in extreme situations, as this strategy will not eliminate deep periprosthetic infection and is generally associated with a very poor prognosis.30 This treatment should be considered only when all of the following criteria are met:

1. it is not feasible to remove the prosthesis, most often because of a medical condition that precludes an operative procedure,
2. the microorganism is of low virulence,
3. the microorganism is susceptible to an oral antibiotic,
4. the antibiotic can be tolerated without serious toxicity,
5. the prosthesis is not loose.15

2.The long-term results of simultaneous fixed bearing and mobile-bearing TKR J BJS [Br]2007;89-:1317-23

We compared the results of 146 patients who received an anatomic modular knee fixed bearing total knee replacement (TKR) in one knee and a low contact stress rotating platform mobile-bearing TKR in the other.

There were 138 women and eight men with a mean age of 69.8 years (42 to 80). The mean follow-up was 13.2 years (11.0 to 14.5).

The patients were assessed clinically and radiologically using the rating systems of the Hospital for Special Surgery and the Knee Society at three months, six months, one year, and annually thereafter.

The assessment scores of both rating systems pre-operatively and at the final review did not show any statistically significant differences between the two designs of implant. In the anatomic modular knee group, one knee was revised because of aseptic loosening of the tibial component and one because of infection. In addition, three knees were revised because of wear of the polyethylene tibial bearing. In the low contact stress group, two knees were revised because of instability requiring exchange of the polyethylene insert and one because of infection.

The radiological analysis found no statistical difference in the incidence of radiolucent lines at the final review (Student's t-test, $p = 0.08$), most of which occurred at tibial zone 1.

The Kaplan-Meier survivorship for aseptic loosening of the anatomic modular knee and the low contact stress implants at 14.5 years was 99% and 100%, respectively, with a 95% confidence interval of 94% to 100% for both designs.

We found no evidence of the superiority of one design over the other at long-term follow up.

3.**Unexpected Positive Intraoperative Cultures and Gram Stain in Revision Total Hip Arthroplasty for Presumed Aseptic Failure Dec 2007. Vol. 30, 12; 105**

We investigated the incidence of positive intraoperative gram stain and cultures in 103 revision total hips. Seven positive gram stains or cultures were observed. No subsequent infections were observed. All positive results were treated as significant. Unexpected positive culture results or gram stain in an otherwise low suspicion revision total hip arthroplasty should be treated as significant. It is now recommended that multiple cultures be obtained and that a single isolate may not be a significant finding

This study determined the incidence of positive intraoperative cultures in a series of revision THA with presumed aseptic loosening and infection ruled out. Additionally, the significance of a positive intraoperative culture and the use of perioperative treatment of a positive culture are evaluated.

Materials and Methods

2001 to June 2002; Retrospectively reviewed. All patients were screened for infection using first clinical evaluation. Patients with a clinical suspicion for infection underwent laboratory screening, radionucleotide imaging, and aspiration at the discretion of the operative surgeon, thus defining our algorithm. 103 revision THA in 101 patients. Minimum 12-month follow-up with an average follow-up of 31.6 months.

All positive culture or gram stain results were considered significant and these patients were given appropriate antibiotics intravenously for 6 weeks. Patients with a positive gram stain were treated empirically under the direction of the infectious disease consultant with antibiotics orally for 6 weeks.

Results

Seven (6.8%) positive intraoperative cultures or gram stains were identified: 2 positive gram stains (gram-positive; no growth), 1 Staphylococcus epidermidis, 1 methicillin-resistant S epidermidis, 2 methicillinresistant Staphylococcus aureus, and 1 Enterococcus feacalis. None of these patients had undergone preoperative aspiration.

Discussion

The current study demonstrates that in patients with low clinical suspicion, negative preoperative evaluation, and are assumed to be free of infection, 6.8% had a positive intraoperative gram stain or culture at the time of revision. If these are considered significant results, then a step-wise algorithm for ruling out infection appears to miss approximately 7% of infected cases.

Because we reviewed patients with low preoperative suspicion for infection, the sensitivity, specificity, and post-test likelihood values for any specific algorithm cannot be calculated. We are not attempting to justify the methodology of ruling out sepsis preoperatively, as this has been covered extensively.1-5

We recommend 6 weeks of culture specific intravenous antibiotics for any unexpected positive culture or oral antibiotics for a positive gram stain. Additionally, only single swab cultures were obtained. Multiple cultures, including fluid and soft tissue, should be taken in any revision surgery.

Single positive cultures may then be able to be more easily regarded as non-significant and perhaps 6 weeks of antibiotic therapy can be avoided in these cases.

4.Performance of 11 516 uncemented primary femoral stems from the Norwegian arthroplasty register J Bone Joint Surg [Br]2007;89-B:1574-80

Primary uncemented femoral stems reported to the Norwegian arthroplasty register between 1987 and 2005 were included in this prospective observational study. There were 11 516 hips (9679 patients) and 14 different designs of stem. Kaplan-Meier survival probabilities and Cox regression were used to analyse the data. With aseptic loosening as the end-point, all currently used designs performed excellently with survival of 96% to 100% at ten years. With the end-point as stem revision for any cause, the long-term results of the different designs varied from poor to excellent, with survival at 15 years ranging between 29% and 97%. Follow-up for longer than seven years was needed to identify some of the poorly-performing designs. There were differences between the stems; the Corail, used in 5456 hips, was the most frequently used stem with a survival of 97% at 15 years. Male gender was associated with an increased risk of revision of 1.3 (95% confidence interval 1.05 to 1.52), but age and diagnosis had no influence on the results. Overall, modern uncemented femoral stems performed well. Moderate differences in survival between well-performing stems should be interpreted with caution since the differences may be caused by factors other than the stem itself.

Discussion

The group 1 stems in our study all performed well with regard to fixation; this agrees with other reports. When the endpoint was revision for any reason, the best performing uncemented designs had a survival exceeding 95% at ten to 15 years. Although there were differences among the designs, all group 1 implants had a survival at ten years exceeding 90%. Some implants, now discarded, performed poorly. In an early report from the register, Biofit, Femora and Harris-Galante implants showed high rates of failure at 4.5 years;17 these poor results were confirmed in the present study at long-term. The currently-used uncemented stem implants all had survival rates of 95% or better at seven years. However, the ability of registers to detect small differences between the best performing designs is questionable.Since confounding factors other than age, gender,and diagnosis are not considered, small differences,although perhaps statistically significant, must be interpreted with caution.

Approximately 300 to 400 Corail stems comprising almost 50% of the total numbers, were implanted each year. For the other designs, this number was much lower, with possible adverse effects on survivorship. Familiarity with the Corail implant, therefore, may have contributed to its good survivorship and the importance of subtle differences in the results, although statistically significant, must not be overestimated

The Norwegian arthroplasty register is continually updated as new implants and modifications appear. In general, the impact of changes of design on survival cannot be assessed with certainty until long-term follow-up of the altered component is available.

The well-performing stem designs were all titanium alloys with rough or coated surfaces but differed in other aspects.

In conclusion, designs of femoral stem in current use all performed well, some excellently, with follow-up to 19 years. Survival of the implants was excellent when the endpoint was revision for aseptic loosening. When the endpoint was revision for any cause, there were differences among the stems..

5.Clinical Performance of Highly Cross-Linked Polyethylenes in Total Hip Arthroplasty JBJSA 2007;89:2779

_ Aseptic loosening secondary to wear-debris-induced osteolysis has been identified as the leading cause of late failure of total hip arthroplasty.

Highly cross-linked polyethylene acetabular liners were developed as one approach to reducing this wear.

_Preclinical laboratory wear testing showed a number of cross-linked polyethylenes to have dramatically less wear than the polyethylene that had been in use for several decades.

_ After the initial bedding-in phase (one to two years), the percent reductions in the wear rate, as indicated by the amount of penetration of the head into the socket evident on serial radiographs, have been comparable with what was predicted from preclinical hip-simulator testing of the highly cross-linked polyethylenes.

_ To our knowledge, there have been no reports of clinically relevant osteolysis that was clearly attributable to wear of a highly cross-linked polyethylene acetabular liner. However, the clinical performance of these materials should be closely monitored with long-term follow-up.

Clohisy et al.3 reported that aseptic loosening, dislocation, and osteolysis were the primary reasons for revision in 82% of their cases.

Factors Influencing Clinical Performance

Traditionally, patient factors such as age, gender, body mass index, and activity level have been related to increased polyethylene wear; however, neither early nor midterm clinical wear of highly cross-linked polyethylene liners appears to be measurably influenced by these factors.

Proper alignment of the acetabular component is essential for a satisfactory long-termclinical performance of any type of polyethylene. When a cup is inserted in excessive vertical alignment, the contact zone between the ball and cup may be near or at the upper rim (equator) of the cup. This may cause excessively high stresses in the polyethylene, in turn leading to rapid wear and/or fatigue fracture3

Second, because of its greater resistance to wear, highly cross-linked polyethylene has been made available for use with larger-diameter balls, to decrease the risk of neck-socket impingement and dislocation. As a consequence, these liners are necessarily thinner, especially at the rim in the location of the locking mechanism, which also reduces the resistance to fatigue cracking39.

It has been reported that the highly cross-linked polyethylene liners demonstrated a 90% reduction in wear when they were used with a 28-mm femoral head and an 85% reduction in wear when they were used with a 32-mm head41. Furthermore, the authors stated that increasing the head size did not significantly increase the wear of the highly cross-linked polyethylene liners. Similarly, in a study with a mean duration of follow-up of 3.3 years,

Accuracy of Wear Measurement Techniques

Techniques for measuring femoral head penetration on serial radiographs fall into three categories: manual, computer-assisted, and radiostereometry analysis. Each technique has advantages and disadvantages, and there is no clear consensus in the literature regarding which of the three is the most

suitable for assessing femoral head penetration into highly cross-linked polyethylene liners. We are not aware of any single study in which all three techniques have been directly compared, although manual techniques have been compared with computer-assisted techniques 43,44 and computer-assisted techniques have been compared with radiostereometry analysis45.

A modified version of the technique described by Dorr and Wan appeared to be the more accurate of the two manual techniques, with the 0.17-mm mean errorwith this technique being closer to the 0.14-mm mean error of the computerized technique described by Devane et al. than to the 0.21-mm mean error of the manual technique described by Livermore

Radiostereometry analysis is considered to be the most accurate method for measuring femoral head penetration. This technique demonstrates the relative change of position over time between the femoral head and multiple radiolucent beads embedded in the polyethylene liner. The mean accuracy has been reported to range from 0.033 to 0.036 mm in the medial direction and from 0.022 to 0.023 mm in the superior direction51,52. However, use of this technique in prospective clinical trials involving large numbers of patients can be both time and cost prohibitive.

Retrieval studies have demonstrated backside wear in 16%53 and 27%54 of modular liners made of traditional ultra-high molecular weight polyethylene, and the resultant polyethylene debris could contribute to osteolysis. We are not aware of any published studies addressing the amount of backside wear occurring in acetabular cups made of highly cross-linked polyethylene

Very favorable midterm results (at 4.1 to 7.2 years) also were reported by Engh et al.35, who performed a randomized, prospective study comparing the clinical performance of seventy-six Marathon liners (DePuy Orthopaedics, Warsaw,Indiana), cross-linked with 5 Mrad (50 kGy), with that of ninety traditional ultra-high molecular weight polyethylene liners that had been sterilized with gas plasma and therefore were not cross-linked

Osteolysis is rare in patients in whom the polyethylene cup is wearing at a rate of less than about 0.1 mm/yr

The mean particle size is smaller with highly cross-linked polyethylene and that, in equivalent volumes, smaller particles tend to be more likely to cause osteolysis

6.Controversies and Techniques in the Surgical Management of Patellofemoral Arthritis JBJS 89-A 2788

The relative lack of interest in the Patellofemoral joint is surprising given the fact that patellofemoral symptoms are relatively common and can be extremely debilitating.

Joint Forces

In early flexion, there is a small compressive force vector on the Patellofemoral joint. As flexion increases, so do the compressive forces across the joint. The three major forces acting on the patella include (1) the pull of the quadriceps, (2) the tension in the patellar tendon, and (3) the joint reactive force of the patellofemoral joint.

Unlike a simple lever arm, the patella creates a changing fulcrum position for the quadriceps force. The patellar tendon force is therefore always less than the quadriceps force and is more pronounced in deep flexion. As detailed above, in early flexion this point is in the inferior pole of the patella and in deeper flexion this point moves to the superior pole. Estimates of the forces through the patella range from 1.5 times body weight at 30_ of flexion to six times body weight at 90_ of flexion.

Patellofemoral Contact Patterns

As the contact point of the patella migrates from the inferior pole in early flexion to the superior pole in deep flexion, the contact surface area increases.

There is a steady increase in contact surface area from initial contact in early flexion to about 60_.

There are mixed reports regarding the area of patellofemoral contact from 60_ to 90_6.

After 90_ of flexion, the reported amounts of contact area have varied,depending on individual anatomy, the amount of force applied by the quadriceps tendon, and the thickness of the articular cartilage. It should also be noted that the quadriceps tendon plays a large role in the transfer of load. Past90_ of flexion, the tendon transfers load to the trochlear groove of the femur, providing more contact as well8.

History and Physical Examination of Patients with an ArthriticPatellofemoral Joint

Anterior knee pain:The pain is often worse with prolonged flexion or when the patient is going downstairs. Knee catching, locking, or giving-way are less specific symptoms that may or may not represent pathological involvement of the patellofemoral joint.

Measurement of the Q angle provides a key piece of information

The normal Q angle ranges from 10_ to 20. Aglietti et al.11 described a normal Q angle of 17_ in females and 14_ in males.

The patient seated with the legs over the side of the examination table. The lower limbs should be visually inspected first. Patella alta, or superior displacement of the patella, is common in patients with a patellofemoral disorder, particularly instability.

As the knee is flexed past 30_, the patella engages the middle of the femoral sulcus13. Lateral subluxation of the patella in terminal extension is known as the ‘‘J sign.’’ As the knee is subsequently flexed and extended, the patella may appear to jump in and out of the femoral sulcus. Another test is the active quadriceps pull test14, in which the knee is extended and the patient is asked to contract the quadriceps muscles.

The apprehension sign of Fairbank [20_ and the examiner then applies a laterally directed force on the patella.]

Treatment

1.Physio

2.Antiinflammatory

3. The patellar McConnell tape technique can be useful when excessive lateral patellar translation and tilt are part of the clinical presentation.

Surgical

1.Arthroscopic D´ebridement

When a patient presents with mechanical symptoms and a loose body is suspected or confirmed on imaging studies, an arthroscopic d´ebridement may be warranted. A chondroplasty may also temporarily relieve discomfort

2.Arthroscopic Lateral Retinacular Release

This procedure is frequently utilized and is most effective for treatment of isolated lateral patellar tilt. When clinical and radiographic examinations confirm excessive lateral tilt, lateral facet arthritis may ensue (Fig. 1). Release of the lateral retinacular structures may decrease pressure on the lateral facet and decrease pain.

3. Lateral Patellar Facetectomy

In patients with long-standing Patellofemoral disease, excessive lateral tilt and/or translation may lead to the formation of a large lateral osteophyte visible on the Merchant radiograph

4.Proximal Soft-Tissue Realignment

Proximal soft-tissue realignment procedures have also been advocated as a way to unload the lateral facet and improve patellar tracking.

5.Distal Realignment

Osteotomy for Realignment and/or Resurfacing

Tibial tubercle transfer is recommended for treatment of patellofemoral arthritis in patients in whom unloading of discrete areas of patellar and femoral disease can lead to clinical success.

This procedure, known as the Maquet osteotomy, is designed to unload the more distal areas of the patella and decrease overall forces within the joint itself. It is particularly effective in younger patients with distal patellar articular degeneration

Medial Tibial Tubercle Transfer

This operation, known as the Elmslie- Trillat procedure, is a direct medial transfer procedure. It is effective for controlling instability and lateral tracking2

Anteromedial Tibial Tubercle Osteotomy [Fulkerson]

Autologous Cartilage Resurfacing

Autologous chondrocyte implantation may be indicated for the management of focal chondral defects in the knee of a young patient. The procedure may be considered when an intact joint space has been documented on radiographic examination

The patients were surveyed, and 71% were satisfied with the outcome, 16% were neutral, and 13% were dissatisfied.

Patellectomy

Patellectomy has been performed for over a century as one of the surgical treatments of severe anterior knee pain26,37. Its popularity has waxed and waned over time, with mixed results and opinions regarding its effectiveness.

One of us (J.P.F.) found that patellectomy provided adequate pain relief but with permanent loss of knee extensor power17. In the end, the results had deteriorated with time in the majorityof patients. The operation should be viewed as a salvage procedure, and the surgeon should warn the patient against unrealistic expectations concerning the outcome. Historically, the best results have been noted in patients with severe arthrosis of the patellofemoral joint.

Replacement [Patellofemoral Arthroplasty]

Patellofemoral arthroplasty can work well in patients of normal stature with isolated patellofemoral disease and no secondary gain issues.

Isolated patellofemoral arthritis occurs in up to 10% of patients who have osteoarthritis of the knee.

The Lubinus prosthesis was reported to have a 50% failure rate at eight years i

The Avon patellofemoral arthroplasty was a second-generation design:: results are better

Total Joint Arthroplasty

The use of total knee replacement to treat severe isolated patellofemoral arthrosis that is recalcitrant to therapeutic measures has been well established for older patients4

There is evidence

of Retinacular release in these patients, which are as high as 68%, a threefold increase compared with the rates associated with standard TKA

Positioning of the femoral and tibial components is of supreme importance. Valgus angulation of the femoral component will increase the Q angle and produce a laterally directed muscle vector. This alignment error is more common in patients with degenerative arthritis who have a preoperative valgus deformity of >10_ combined with loss of bone stock of the distal part of the lateral femoral condyle

The current literature seems to favor patellar resurfacing. Multiple studies have demonstrated success with patellar resurfacing, with good relief of pain and good overall outcomes58-60.

However, other studies have shown success without insertion of a patellar component61. Ideally, a patient treated without patellar resurfacing should have no patellar arthritis

‘‘Overstuffing’’ of the Patellofemoral joint by using a femoral component that is too large (especially in the anteroposterior dimension) or resecting an inadequate amount of the patella increases tension on the lateral retinaculum

7.Copeland surface replacement of the Shoulder J BJS 2007;89-B:1466-9.

We describe the results of Copeland surface replacement shoulder arthroplasty using the mark III prosthesis in patients over 80 years of age. End-stage arthritis of the shoulder is a source of significant pain and debilitating functional loss in the elderly. An arthroplasty offers good relief of pain and may allow the patient to maintain independence. The risk benefit ratio of shoulder replacement may be felt to be too high in an elderly age group, but there is no published evidence to support this theory. We have assessed whether the procedure was as reliable and safe as previously seen in a younger cohort of patients.

Between 1993 and 2003, 213 Copeland surface replacement arthroplasty procedures were performed in our unit, of which 29 (13.6%) were undertaken in patients over the age of 80. This group of patients was followed up for a mean of 4.5 years (2.1 to 9.3). Their mean age was 84.3 years (81 to 93), the mean operating time was 40 minutes (30 to 45) and the mean in-patient stay was five days (2 to 21). There were no peri-operative deaths or significant complications. The mean Constant score adjusted for age and gender, improved from 15.1% to 77%. Copeland surface replacement shoulder arthroplasty may be performed with minimal morbidity and rapid rehabilitation in the elderly.

Technique

The operation was performed using a minimally invasive technique through the anterosuperior approach described by Neviaser and Neviaser12 and MacKenzie13. This has the advantages of a smaller wound and easier access to the glenoid through the rotator interval, and to the posterior and superior cuff for reconstruction. An acromioplasty and excision arthroplasty of the acromioclavicular joint are carried out if indicated and to further improve the exposure. The details of the exposure and operating technique have been described previously.To expose the glenoid, the humeral trial component is left in situ to protect the head of humerus from damage by subsequent retraction. An extensive capsulotomy is made around the glenoid. Adequate exposure is provided by retraction of the humeral head posteroinferiorly using a Bankart skid (Biomet) or Fukuda (Biomet) retractor. The rotator cuff was intact in 13 shoulders, 12 with OA and one with AVN and deficient and torn in the remainder. A rotator cuff repair was carried out on seven patients. In a further six patients from the rotator cuff arthropathy group, a repair was attempted. The mean operating time was 40 minutes

Discussion

The percentage of Americans aged over 65 years is expected to increase from 12.6% of the total population today to 20% by 2030.Many reports of hip and knee replacement in the octogenarian patient have shown significant improvement in pain and function.. However, there has been no account of the outcome following shoulder replacement. An increased rate of complications has been reported in elderly patients undergoing elective arthroplasty of the lower limb, but our complication rate was similar to that experienced in younger patients.

Surface replacement performed through an anterosuperior approach is a minimally-invasive technique. Reaming of the medullary canal and the use of bone cement is not necessary.

Surface replacement, unlike the use of stemmed implants, avoids a focal stress riser at the distal tip of the implant. This is of particular relevance in patients with generalised osteopenia.

8.Tibialis Anterior Rupture: Acute and Chronic . Foot and Ankle Clinics of North Am 12[4] 2007,569-572

Rupture of the tibialis anterior tendon is an unusual injury. Most ruptures occur in elderly men with a history of minor trauma. The sudden occurrence of a “foot drop” is often the presenting symptom. The diagnosis is frequently delayed. The acute rupture is best treated by direct repair. Treatment of the chronic rupture is tailored to the patient. In relatively inactive patients, either a polypropylene ankle–foot orthosis or no treatment at all is indicated. In the more active patient, a reconstruction using extensor hallucis longus helps restore dorsiflexion function.

9.Moderate to severe hallux valgus.J BJS 2007;89A:2520-2531.

Selection of the proper procedure for hallux valgus surgery is critical

Mann and Coughlin defines modern decision making

I The MTPJ should be examined radiographically for congruency

If the joint is congruent, surgery must be planned so that it does not alter the congruency.

When the MTPJ is incongruent, surgery is planned to restore joint congruency.

II Bunion deformity: classified as mild, moderate, or severe

III Other considerations are the presence of metatarsophalangeal arthritis,

hypermobility of the tarsometatarsal joint complex,

Presence of hallux valgus interphalangeus.

This article is limited to a review of two procedures:

Correction by proximal metatarsal osteotomy with distal soft-tissue rebalancing Vs bunion correction by arthrodesis of the MTPJ

Bunion correction by proximal metatarsal osteotomy with distal soft tissue rebalancing is indicated primarily for moderate and severe bunions

Fusion is most commonly done for the treatment of hallux valgus associated with arthritis or as a salvage procedure following failed previous bunion surgery and attempted arthroplasty. Other indications include neuromuscular conditions that cause spasticity, such as cerebral palsy and stroke, because of the high recurrence

First Metatarsal Osteotomies

Osteotomy of the first metatarsal has been studied extensively. The geometric principles used .One degree of correction of IMA is achieved on average for each mm of lateral translation in distal osteotomies of the metatarsal head.

Moving the osteotomy more proximally moves the center of rotation, and more correction is achieved per degree of rotation. Kummer and Jahss also noted that a degree of shortening and elevation of the first metatarsal head is inherent in these osteotomies.

Nyska et al. Performed a geometric analysis of the Ludloff, Mau, Scarf, proximal chevron, proximal crescentic, and wedge osteotomies. They noted the best correction was achieved by the Ludloff osteotomy angled 16° to the shaft; however, this caused elevation and shortening. The 8° Ludloff osteotomy provided angular corrections similar to those provided by the basilar wedge and crescentic osteotomies, but with less elevation and shortening.

The stability of first metatarsal osteotomies has been studied extensively, and these osteotomies have been classified according to their geometry. Complete osteotomies are those that divide the metatarsal into two separate fragments. These osteotomies can achieve correction through multiplanar manipulation of the distal

Fixation of all metatarsal osteotomy sites is recommended regardless of inherent stability or instability. Distal osteotomies have intrinsic stability of great enough magnitude that Kirschner wire fixation is often adequate. Because of the increased moment arm present with proximal osteotomies, simple Kirschner wire fixation is usually inadequate for definitive fixation. Screw fixation of osteotomy

sites has been proven to be biomechanically superior to pin fixation in several studies and can provide rigid fixation of some otherwise unstable constructs22,23.

Use of a plate for primary fixation in bunion surgery is relatively uncommon despite mechanical and clinical data that show that they provide more stability than simple screw fixation24,25.

Technically, application of small plates designed for fracture fixation can be quite time-consuming because of the need for finely adjusted contouring of the devices.

Proximal Crescentic Osteotomy

To perform a proximal crescentic osteotomy, as popularized by Mann et al.26-28, the surgeon utilizes a curved oscillating saw to create an osteotomy from the proximal-dorsal aspect of the metaphysis to the plantar aspect of the proximal part of the diaphysis. The intermetatarsal angle is corrected by rotating the distal fragment in the trough created in the base of the first metatarsal. Rather than simply rotating in a single plane, the distal fragment rolls in the inclined trough created by the saw blade, and medial or lateral angulation of the osteotomy will cause elevation or depression of the metatarsal head, respectively, as the distal fragment is rotated laterally29. The osteotomy site is fixed with a single compression screw from the dorsal cortex of the distal fragment to the plantar aspect of the metaphysis of the proximal fragment.

Regardless of the fixation technique, the proximal crescentic osteotomy remains one of the most unstable first metatarsal osteotomies.

Proximal Chevron Osteotomy

The chevron osteotomy pattern has also been used in the proximal part of the metatarsal for correction of moderate and severe metatarsus primus varus

Nyska et al. found that less correction was achieved with the proximal chevron osteotomy than with the Ludloff

The proximal chevron osteotomy was thought to be technically easier to perform because of its inherent stability.

Scarf Osteotomy

The Scarf osteotomy was introduced to the surgical community by Zygmunt et al.44, and its use for the correction of moderate and severe metatarsus primus varus has steadily increased in Europe and elsewhere.

As originally described, the osteotomy is horizontal in the distal part of the diaphysis, with a limb exiting superiorly at the distal end of the metatarsal and a limb exiting proximally at the midpart of the diaphysis. The osteotomy provides tremendous inherent stability to displacement as a result of the long dorsal shelf afforded with the horizontal saw cut.

The originally described osteotomy achieved correction by lateral translation of the distal fragment. Barouk45and Weil46 proposed numerous modifications, including lengthening or shortening of the metatarsal, rotation of the distal fragment, raising or lowering of the metatarsal head, and correction of the distal metatarsal articular angle by rotation of the distal fragment,.

Ludloff Osteotomy

Despite the inherent instability of its geometry, the Ludloff osteotomy affords a broad surface for screw fixation, which substantially increases the relative strength of the construct.

Lian et al. noted that a Ludloff osteotomy site fixed with two screws was 82% stronger than the site of a crescentic osteotomy fixed with a single screw22

The Ludloff osteotomy with screw fixation for correction of hallux valgus has had excellent clinical results. After an average duration of follow-up of thirty months, the satisfaction rate was 94%

Arthrodesis of the Hallux MTJ

Arthrodesis was considered for moderate bunions if degenerative changes of the I MTPJ were seen radiographically

Overall satisfaction was rated as 86%, although hardware frequently had to be removed (in 30% of the cases)

Hallux valgus associated with spasticity, as is commonly seen in patients with cerebral palsy, has a high recurrence rate when treated with standard techniques. It is recommended fusion for primary treatment in children with a spastic foot deformity.

Grimes and Coughlin reported 33 cases in which a failure of hallux valgus surgery was treated with arthrodesis. Four nonunions resulted, three of which were asymptomatic.

A review of the available mechanical data shows plate-and-screw fixation to be the most stable, followed by interfragmentary or intramedullary screw fixation, both of which are superior to fixation with Kirschner wires or compression staples73-75.

Final positioning should consist of 10° to 20° of hallux valgus, but care must be taken to allow clearance of the second toe by 1 to 2 mm. Dorsiflexion should be 15° to 30° from the first metatarsal, or 5° to 10° from the floor.

A good way to assess the final position intraoperatively is to press the foot flat on a sterile plate (an instrument case lid. The hallux should not impinge on the second toe, rotation should be neutral with the axis of the floor, and there should be approximately 5 mm of space between the plate and the pulp of the hallux.

Malpositioning is the most common complication associated with this surgery.

Excessive dorsiflexion may cause difficulty with shoe-wear and transfer lesions at the lesser metatarsophalangeal joints.

10.Proximal Tibial Opening Wedge Osteotomy for Chronic Posterolateral Corner Deficiency in the Varus Knee.Am. J. Sports Med. 2007; 35; 1844

Background: Nonoperative treatment of posterolateral knee injuries tends to yield poor results. In patients with chronic posterolateral knee injuries, failure to correct genu varus alignment will often result in failure of the posterolateral knee repair or reconstruction.

Purpose: To prospectively assess the functional outcomes of patients with combined grade 3 posterolateral instability and genu varus alignment initially treated with a proximal tibial opening wedge osteotomy.

Study Design: Cohort study (prognosis); Level of evidence, 2.

Methods: 21 patients with combined chronic posterolateral corner deficiency and genu varus alignment were initially treated with a proximal tibial opening wedge osteotomy and observed prospectively. Second-stage ligamentous reconstruction was performed in patients with continued clinical and functional instability after the osteotomies had healed and they had undergone at least 3 months of rehabilitation.

Results: At a mean follow-up of 37 months, 8 of 21 patients (38%) had sufficient improvement in knee function that a subsequent posterolateral corner reconstruction was not necessary. There was a significant difference in coronal alignment between the preoperative and postoperative mechanical axis action point. There were no significant differences in the preoperative and postoperative posterior tibial slope. Thirteen patients underwent a second-stage ligament reconstruction at an average of 13.8 months after the initial osteotomy procedure. Final postoperative Cincinnati Knee Rating System scores were significantly lower for those patients who required a subsequent posterolateral corner reconstruction than for those patients who did not have a reconstruction. The P value for the preoperative differences between groups was not significant (P — .11). Seven of 9 patients with high-velocity knee injuries required a second-stage reconstruction. Ten of 14 patients (71 %) with multiligament knee injuries required a posterolateral corner reconstruction. In contrast, 4 of 6 patients (67%) with an isolated posterolateral corner injury did not require a second-stage ligament reconstruction.

Conclusion: Proximal tibial opening wedge osteotomy can be an effective first method of treatment for patients with chronic combined posterolateral knee injuries and genu varus alignment. Patients with low-velocity knee injuries and isolated chronic posterolateral knee injuries may not require a second-stage soft tissue ligament reconstruction after healing the osteotomy and undergoing a program of rehabilitation.

Technique

All patients were initially treated with a proximal tibial opening wedge osteotomy using a medial plate (Arthrex, Naples, Fla) and allograft bone graft

An attempt was made to correct the genu varus alignment such that the corrected mechanical axis passed through the downslope of the lateral tibial spine.

Plates with an anterior sagittal plane slope were used in patients with a concurrent ACL deficiency in an attempt to decrease the sagittal tibial slope, and plates with a posterior sagittal plane slope were used in patients with a concurrent PCL deficiency in an attempt to increase the posterior tibial slope.

Patients were nonweightbearing for the first 8 weeks. Patients were encouraged to remove the knee immobilizer and to work on full knee motion out of the immobilizer 4 times daily.
Patients who reported continued functional deficits and instability after a minimum 6-month period of convalescence after the osteotomy were subsequently treated with a second-stage posterolateral and other necessary cruciate ligament reconstruction.

Discussion

1.PLI does not heal without surgical intervention. With chronic PLC injuries, it is recommended to correct any concurrent genu varus alignment before any attempt at ligamentous reconstruction.
2. Main cause for clinical functional improvement and subjective stability is genu varum
3.IIstage ligament reconstruction was unnecessary in 38% of the patients we studied.
4.In patients with associated genu varus alignment, this inherent instability is worsened because a weightbearing axis that passes through the medial compartment may place excessive tension on soft tissue PLC reconstruction grafts, which may cause them to stretch out over time.
5.A primary repair is very difficult to perform 3 months after injury, and these patients must be treated for a chronic posterolateral knee injury at this point. In patients with ligamentous injuries occurring greater than 3 months before initial examination, it is our practice to obtain long leg standing radiographs to assess the mechanical axis and the mechanical axis action point before any ligamentous reconstruction procedure. We believe that by correcting the mechanical axis out of varus alignment and into neutral or slight valgus alignment, sufficient mechanical and functional stability can be achieved in a significant number of patients (38%).
6. A medial proximal tibial opening wedge osteotomy is our preferred osteotomy approach. In contrast to a lateral closing wedge proximal tibial osteotomy, an opening wedge osteotomy has the theoretical advantage of tightening the posterior capsule and oblique popliteal ligament complex
7.Opening wedge osteotomy allows for the potential of improved sagittal plane correction to address instability associated with either an ACL or PCL deficiency. Plates with an anterior sagittal slope were used in patients with solely a concurrent ACL deficiency, and plates with a posterior sagittal slope were used in patients with solely a concurrent PCL deficiency because it has been demonstrated that improved knee stability is seen in patients under these conditions.
However, in our study, there was no significant difference between the preoperative and postoperative posterior tibial slopes for any of the patients or within any of the groups, so no definitive conclusion can be made.

11. Clinical Outcomes of Coracoclavicular Ligament Reconstructions Using Tendon Grafts.THE AM J OF SPORTS MED 35:1912-1917 (2007)

Background: Numerous techniques for reconstruction of the coracoclavicular ligaments have been developed to treat acromioclavicular joint separations. A new, stronger method to reconstruct the coracoclavicular ligaments using semitendinosus tendon allografts has been previously described. No outcome studies have been published on this new procedure.

Hypothesis: Reconstruction of the coracoclavicular ligaments using tendon grafts produces excellent functional results.

Methods: Nine patients underwent coracoclavicular ligament reconstruction using augmented cadaveric semitendinosus tendon allografts after a grade V acromioclavicular separation. All patients were evaluated for range of motion, strength, closed kinetic chain testing, the American Shoulder and Elbow Surgeons Rating Scale, Pennsylvania Shoulder Score, the Simple Shoulder Test, and the Acromioclavicular Joint Separation Questionnaire. Preoperative and postoperative radiographs were compared.

Results: Range of motion measurements were normal in all motions except a loss of 5° ± 4° ($P < .05$) in extension. No significant strength deficits were found. Functional closed kinetic chain tests scored comparatively to standardized norms. American Shoulder and Elbow Surgeons Rating scores were 96 ± 5 out of 100; the Pennsylvania Shoulder Scale scores were 97 ± 3 out of 100; the Simple Shoulder Test scores were 11.6 ± 0 out of 12; and Acromioclavicular Joint Separation Questionnaire scores were 28 ± 3 out of 31. Subjects reported an overall subjective satisfaction of 89% ± 7%. Postoperative radiographs showed no loss of reduction of the acromioclavicular joint in any patient.

Conclusion: Outcome for coracoclavicular ligament reconstructions using augmented semitendinosus tendon grafts was excellent with full recovery of strength, minimal range of motion loss, and no clinical or radiographic loss of reduction of the acromioclavicular joint.

Surgical Technique

A 4-cm longitudinal saber incision was made in line from the clavicle to the coracoid process. The deltotrapezial fascia was taken down subperiosteally exposing the clavicle, AC joint, and the coracoid process. The distal 1 cm of the clavicle was excised using an oscillating saw. A 4.0-mm vertical drill hole was placed into the middle third of the clavicle directly in line with and superior to the coracoid process. Both a 5-mm Mersilene suture (Ethicon, Somerville, NJ) and a semitendinosus tendon allograft were simultaneously threaded under the coracoid process. The medial limb of the tendon allograft and tape was brought into the clavicular hole from inferior to superior, then brought anterior to the clavicle and tied on the lateral side. The Mersilene tape was tied first to facilitate reduction of the clavicle to the acromion. The tendon ends were secured by tying them into a double surgical knot supplemented with side-to-side sutures using 0 Ethibond (Figure 1). The tendon graft was tensioned slightly more than

that of the Mersilene tape, allowing the tendon graft to take up tension rather than the Mersilene tape. A secure closure of the deltotrapezial fascia was then performed.

Discussion

The techniques such as direct suture repair, suture and suture anchor cerclage, coracoclavicular screws, or some combination of these techniques rely on holding the relationship between the coracoid and clavicle for a long enough period of time to allow for primary healing of the CC ligaments. Whether this allows for true healing approaching the strength of the native CC ligaments is debatable. Previous studies have shown that Weaver Dunn reconstructions have failed at an average of 70 N compared with 641 N for the native CC ligaments.[18]

We have previously shown in vitro that tendon graft reconstructions using hamstring tendons have significantly superior strength characteristics than CA ligament transfers, suture, or tape cerclage. These tendon graft reconstructions failed at an average of 618 N, which was not statistically different than the native CC ligaments.

Based on several in vitro biomechanical studies,[6,12,13,15,18] a pilot case report study,[16] and now this series of patients, hamstring tendon graft reconstructions appear to offer a viable alternative for the treatment of operable AC separations. This technique offers a strong biological reconstruction that should be able to respond to stresses and strains and does not interrupt the normal healing of the native CC ligaments. It does not require hardware removal, can be used for both acute and chronic injuries, and is relatively simple to perform.

12.ELBOW STIFFNESS: ETIOLOGY, TREATMENT, AND RESULTS. The hand Vol. 5. NO. 4, 2005

Elbow stiffness is a common problem after trauma to the elbow.
The goal of treatment should be to achieve a functional range of motion (30° 130°).
Surgical options depend on the degree of degenerative change in the elbow joint.
With mild to moderate OA: Outerbridge-Kashiwagi arthroplasties
Severe degenerative changes, the options are more limited depending on the age and activity level of the patient.

Some reports show that up to 25% of humerus fractures"2 and 15% of simple elbow dislocations commonly result in elbow stiffness and extension deficits. In another series, 21% of patients with ulnohumeral dislocation and associated radial-head fractures had residual elbow stiffness.

Classification [Morrey]
Extrinsic: :skin scarring, capsular contractures, collateral ligament shortening, myostatic contractures, and heterotopic ossification.
Intrinsic cludes articular incongruity or adhesions, osteophytes, or fibrous impingement within the fossa, loose bodies, and degeneration of articular cartilage.

Assessment
A thorough patient history
The skin should be examined for scars and contractures
Elbow stiffness per se is not painful
Synovitis, effusion, and crepitation all are findings that point to a loose body or osteochondral injury as the cause.
The ulnar nerve should be examined carefully
AP, , lateral, and oblique Xrays
CT scans
MRI usually is not done
Prevention of elbow stiffness
The best management strategy for elbow stiffness is to prevent it. During upen reductiun and internal fixation of fractures, the exposure must be atraumatic and results in rigid and anatomic fixation of the fracture. Early range of motion should be instituted early but not necessarily immediately and only after the early resolution of swelling. Some have suggested a continuous brachial plexus block combined with continuous passive motion (CPM).
Surgical Treatment
The choice of surgical technique is dictated by the elbow stiffness etiology and the state of preservation of the articular cartilage. For patients with little degenerative changes, soft-tissue releases with partial ostectomy of bony impingement can be helpful. These releases must be performed after the acute inflammatory response to capsular and muscular injury is resolved.

Moderate articular damage is defined as articular cartilage thinning without grade 4 ulceration. In these patients, the Outerbridge-Kashiwagi or debridement arthroplasty is an acceptable option.
In more advanced disease, with extensive loss of articular cartilage, options for younger patients include fascial interposition arthroplasty (with or without distraction) and, in rare and unusual cases, arthrodesis. In older, lower-demand patients, total elbow arthroplasty has provided excellent outcomes.

Open procedures

Open elbow releases, whether primarily lateral, medial, posterior, or combined, can be performed with good outcomes as well.
Approaches should be based on the primary pathology as noted in the clinical and imaging examinations. If forearm rotation is limited, the Kocher approach is utilitarian because it permits excellent visualization of the radiocapitellar joint, which will guide debridement for malunion of the radial head or resection of bony or fibrous synostosis.
A modified lateral column approach has been described that preserves the lateral collateral ligament, whose origin is located central to posterior on the lateral epicondyle.
The medial approach to the elbow is versatile to decompress the ulnar nerve and to access the anterior and posterior humeroulnar joints. The interval between the common flexor origin and the brachialis allows for anterior capsulotomy and debridement of coronoid osteophytes. The posterior interval between the long head of the triceps and flexor carpi ulnaris allows access to the posterior olecranon fossa. The ulnar nerve should be decompressed during any elbow release to prevent a traction injury after increased elbow mobility. Most patients with elbow stiffness do not also have instability but iatrogenic instability can be created after excision of a bony ankylosis, which may obliterate the medial collateral ligament after bony resection.
The posterior approach is preferred for access to the posterior humeroulnar joint. This allows excision of osteophytes, and posterior capsule excavation of the olecranon fossa, triceps muscle slide, and access to the anterior joint through the fossa by fenestration. It does, however, require wide flap dissection to access both the medial and lateral columns. We favor the triceps-sparing approach advocated by Bryan and Morrey.28 In this approach, there is excellent visualization of the humeroulnar joint with some limitation of lateral (radiocapitellar) exposure.

Soft tissue Releases

Soft-tissue release
Achieve the articular congruence
Also, the contracted hypertrophic capsule must be resected, not just incised.
Muscles such as the brachialis, biceps, and triceps, which have undergone myostatic contracture, should have a subperiosteal slide but not tenotomy.
Any heterotopic ossification (HO) in the plane of motion should be excised such as impinging osteophytes or hypertrophic callus.
Osteochondral loose bodies also should be removed.
Critical ligaments such as the anterior oblique medial collateral ligament or the lateral ulnar collateral—annular ligament complex must be preserved.

Early mobilization with active, active-assisted, and passive range of motion is begun. This is facilitated by static progressive splinting.

The use of CPM did not improve mean active extension significantly, but did improve active flexion and added 47° to the total arc of motion at the 3-year follow-up evaluation.

Cohen et a122 performed a modified lateral approach, sparing the lateral ligaments, for the release of posttraumatic stiffness of the elbow in 22 patients with a follow-up period of 26 months. The arc of motion increased from 74° to 129°. Both pain and function in the elbow had improved significantly without causing elbow instability.

Deb ridement arthroplasty [Tsuge]
A posterolateral approach.
Osteophytes and soft tissue are debrided from the olecranon, olecranon fossa, coronoid, coronoid fossa, and the radial head. In 29 elbows reviewed after 64 months, extension improved from 29° to 21°, and flexion improved from 95° to 1200..

OUTERBRIDGE-KASHIWAGI UL
Is a more extensive transhumeral osseous approach that allows access to the anterior joint through a fenestration of the olecranon and coronoid fossa.
The primary indication is elbow stiffness associated with mild to moderate primary osteoarthritis and a focal area of bony impingement and limited capsular contracture. The exposure of the anterior joint is not as extensile as in the medial or combined medial and lateral approaches.
A midline posterior incision is used with a triceps split and excision of the olecranon tip. The olecranon fossa is fenestrated with a dental burr allowing access to the anterior compartment. The coronoid and radial head can be debrided from this approach.
. Results of this procedure in 46 elbows demonstrate the flexion-extension arc improves from 79° to 101°

Distraction fascial arthroplasty
Distraction fascial arthroplasty is preferred in younger, higher-demand patients with global posttraumatic arthritis and disabling stiffness of the elbow. Indications for this procedure include loss of greater than half of the ulnohumeral articular surface or a malunion that causes incongruity of the articular surface.
The interposing membrane, which provides a tough, durable, and elastic autogenous material to cover the distal humerus. The graft is held over the distal humerus with interosseous sutures and distraction is applied to protect the bearing membrane during early incorporation and remodeling.
In a more recent study, Cheng and Morrey36 reported on 13 patients followed for 63 months after distraction interposition arthroplasty using fascia. Sixty-nine percent of patients had satisfactory relief from pain, and 62% had excellent or good functional outcomes. Four patients required revision to total elbow arthroplasty (TEA), with 8 complications including neurapraxial persistent pain, and infection.

TEA

TEA for posttraumatic arthritis has been less durable than for rheumatuid arthritis because the patients generally are younger and more active.

TEA is indicated in low-demand, elderly patients. Nonconstrained elbow prostheses currently are not recommended because of the elbow instability associated with these devices.

Morrey was the first to report exclusively on TEA for posttraumatic arthritis of the elbow. Fifty-three elbow replacements were followed-up for 6.3 years using the Coonrad prosthesis. During the follow-up period, 10 patients underwent 14 revision procedures for aseptic loosening.

HO

HO, the formation of mature lamellar bone in aberrant locations, is often seen about the elbow after significant trauma (Figure 2). The incidence of HO in elbow dislocations or fracture-dislocations has been reported as 3% and 20%, respectively, with one report as high as 56%. The incidence increases with fracture severity and with associated neural axis trauma.

In patients at risk for HO, therapeutic options include hisphosphonates, nonsteroidal anti-inflammatory drugs and radiation therapy to diminish the likelihood of HO formation.4° NSAID inhibit the prostaglandin pathway, thereby interfering with osteoblastic activity, whereas biphosphonates delay bone mineralization. Indomethicin when used is started early in the postinjury period.

Radiographic maturity, in which HO shows sharp cortical margins, usually occurs after 5 months and surgical excision may be performed at this time.

Surgical treatment of HO is indicated for functional impairment and earlier resection may lessen secondary soft-tissue fibrosis, making surgical treatment technically easier.

13. Dorsal Bunion After Clubfoot Surgery: Reverse Jones Procedure. JPO: 27:814

Background: The dorsal bunion deformity consists of the elevation of first metatarsal head, plantar flexion contracture at the first metatarsophalangeal joint, and dorsiflexion contracture of the tarsometatarsal joint. A reverse Jones procedure with transfer of the flexor hallucis longus to the metatarsal head has been an effective method in correcting this deformity.

Methods: This is a retrospective review of 27 patients with 33 feet who had reverse Jones procedure with or without metatarsal osteotomy between 1983 and 2002. All patients had previous soft tissue releases for clubfoot deformity. Clinical reviews included muscle function test and radiographic evaluation before and after procedures. We used the American Orthopaedic Foot and Ankle Society Hallux Metatarsophalangeal-interphalangeal scale for functional outcome results.

Results: The average follow-up was 4.96 years. There were 21 boys and 6 girls. Average age at time of procedure was 13.7 years. With the reverse Jones procedure, there were 18 first metatarsal osteotomies and 12 split anterior tibial tendon transfers.

Before surgery, decreased muscle strength in triceps surae (73%), tibialis posterior (76%), peroneus longus (67%), and extensor hallucis longus (76%) was noted. Patients (84.9%) had normal tibialis anterior and flexor hallucis longus power.

In radiographic evaluations, the operation resulted in decreased elevation of the first metatarsal by measuring the metatarsal-horizontal angle. The lateral metatarsophalangeal angle improved from 23 degrees plantar flexion to 1 degree in dorsiflexion.

The average global American Orthopaedic Foot and Ankle Society Hallux Metatarsophalangeal-interphalangeal score was 70 preoperatively and 92 postoperatively with improvement of subscores in pain, activity, footwear, range of motion, callus, and alignment.

Conclusions: Dorsal bunion is a recognized long-term complication after clubfoot surgery. The causes of the deformity are weakness of Achilles tendon, overpowering of flexor hallucis longus, and strong anterior tibial tendon with weakness of peroneus longus. The reverse Jones procedure improved the condition in this series and provided a long-lasting and effective correction of the dorsal bunion deformity.

Reverse Jones Procedure

A longitudinal incision is made at the medial aspect of the foot starting at the medial cuneiform bone and extending distally to the first metatarsal head.

The flexor hallucis longus is identified and divided distal to the metatarsophalangeal joint and delivered into the proximal part of the wound.

A tunnel is drilled at the junction of the neck and head of the first metatarsal from its dorsal to its plantar aspect.

The distal end of FHL is brought from the plantar to dorsal aspect through the tunnel in the first metatarsal and turned back sutured to itself with first metatarsal in plantar flexion. The flexor hallucis longus now functions as a plantar flexor of the first metatarsal.

Proximal metatarsal flexion osteotomy when needed. G, The osteotomy is internally fixed. H, The end of the tendon is sutured back to itself with metatarsal in flexion position.

14.Surgical Treatment of Unresolved Osgood-Schlatter Disease: Ossicle Resection With Tibial Tubercleplasty. JPO 27(7), 2007, pp 844-84

The mainstay of treatment of Osgood-Schlatter apophysitis is nonoperative. Surgical treatment has been described for patients who have failed nonoperative management of Osgood-Schlatter disease. The purpose of this study is to evaluate the functional outcome of ossicle excision and tibial tubercleplasty for unresolved Osgood-Schlatter disease that has failed nonoperative treatment.

Methods: A retrospective review was performed on 16 knees in 15 patients who underwent ossicle excision and tibial tubercleplasty for unresolved Osgood-Schlatter disease. Functional outcome was assessed using the International Knee Documentation Committee, the Lysholm Knee Scale, and Tegner Activity Score.

Results: Twelve patients (75%) returned to preoperative activities and sports, 2 patients (12.5%) partially returned, and 1 patient (6%) did not return. The mean postoperative Lysholm knee score was 76.5. Patients' individual scores ranged from 40 to 100. The mean International Knee Documentation Committee knee score was 75, ranging from 40 to 100. The mean Tegner activity level was 6.8 (range, 3-10).

Conclusions: It is our recommendation that when patients fail extensive nonoperative management, surgery to remove the symptomatic ossicle should be offered after skeletal maturity. When this is the case, the addition of tubercleplasty should be performed.

SURGICAL DESCRIPTION

Patients underwent ossicle resection and tibial tubercleplasty. An incision of approximately 4 to 5 cm is made over the tibial tubercle. The patellar tendon is split longitudinally. Ossicles are resected. The tibial tubercle prominence is resected using osteotomies or a burr. The patellar tendon split is repaired. Postoperatively, patients follow a rehabilitation protocol, with touchdown weight bearing for 2 weeks, restriction of active knee extension for 4 weeks, and progressive motion and strength exercises. Patients are allowed to return to sports at 8 to 12 weeks postoperatively

15. Thawing the frozen shoulder JBJS 89B

This study prospectively evaluated the outcome of manipulation under anaesthesia and hydrodilatation as treatments for adhesive capsulitis. A total of 36 patients (38 shoulders) were randomised to receive either method, with all patients being treated in stage II of the disease process.

The mean age of the patients was 55.2 years (44 to 70) and the mean duration of symptoms was 33.7 weeks (12 to 76). Eighteen shoulders (17 patients) underwent manipulation under anaesthesia and 20 (19 patients) had hydrodilatation. There were three insulin-dependent diabetics in each group. The mean visual analogue score in the manipulation under anaesthesia group was 5.7 (3 to 8.5; n = 18) before treatment, 4.7 (0 to8.5; n = 16) at two months (paired *t*-test p = 0.02), and 2.7 (0 to 9; n = 16) at six months (paired *t*-test, p = 0.0006). The mean score in the hydrodilatation group was 6.1 (4 to 10; n =20) before treatment, 2.4 (0 to 8; n = 18) at two months (paired *t*-test, p = 0.001), and 1.7 (0 to 7; n = 18) at six months (paired *t*-test, p = 0.0006). The visual analogue scores in the hydrodilatation group were significantly better than in the manipulation under anaesthesia group over the six-month follow-up period ($p < 0.0001$).

The mean Constant score in those manipulated was 36 (26 to 66) before treatment, 58.5 (24 to 90) at two months (paired *t*-test, p = 0.001) and 59.5 (23 to 85) at six months (paired *t*-test, p = 0.0006). In the hydrodilatation group it was 28.8 (18 to 55) before treatment, 57.4 (17 to 80) at two months (paired *t*-test, p = 0.0004) and 65.9 (28 to 92) at six months (paired *t*-test, p = 0.0005). The Constant scores in the hydrodilatation group were significantly better than in the manipulated group over the six-month period of follow-up (p = 0.02).The range of movement improved in all patients over the six months, but was not significantly different between the groups. At the final follow-up, 94% of patients (17 of 18) were satisfied or very satisfied after hydrodilatation compared with 81% (13 of 16) of those receiving a manipulation. Most of our patients were treated successfully, but those undergoing hydrodilatation did better than those who were manipulated.

Manipulation under anaesthesia

Restoration of shoulder movement following a specific protocol to ensure safe breakage of adhesions by using a short lever arm.

2 ml of 2% lignocaine and 30 mg (0.75 ml) of triamcinolone acetonide were injected anteriorly into the glenohumeral joint

Hydrodilatation

An anterior approach. A needle was inserted into the glenohumeral joint and the position checked by image intensifier before and after injection of a small quantity of radio-opaque contrast material followed by normal saline to progressively distend the capsule. It required between 10 ml and 55 ml, usually 30 ml to 40 ml, to cause rupture.

16..**ITB [J Knee Stag. 2007;20:281-284.**

Abstract: Iliotibial hand friction syndrome presents with lateral knee pain usually in runners. When conservative treatment fails, surgical lengthening, or Z-plasty can provide symptomatic relief
This retrospective study evaluated the long-term results of iliotibial hand Z-plasty for chronic iliotibial band friction syndrome in a consecutive series of patients.

Introduction

Iliotibial band friction syndrome, also known as runner's knee or friction syndrome. is a common knee problem that presents with lateral knee pain.

Iliotibial band friction syndrome initially was described in 1968 and has been reported frequently since then.' Reported to affect 1.6% to 12% of runners,8"3'22'24'2 iliotibial band friction syndrome is an overuse injury resulting from an inflammatory response created by excessive friction between the lateral femoral epicondyle and the iliotibial band.2 222 Several etiologies for iliotibial band friction syndrome have been proposed and include iliotibial band tightness, oeruse. lateral femo
Group of 11 patients, 8 were evaluated an average of 75.6 months postoperatively (range: 59-97 months). Average length of preoperative symptoms was 15.6 months (range: 3-36 months), and average length of nonoperative management was 6.9 months (range: 3-24 months). Postoperatively, mean Cincinnati score was 82.9 (range:
55-95), Tegner score was 4.4 (range: 2-7), Lysholm score was 88.6 (range: 57-100), and IKDC activity score was 2.6 (range: 1-4). No adverse eents occurred during surgery. All patients reported complete resolution of lateral knee pain and a full return to preoperative activity levels. Iliotibial Z-plasty was successful for refractory iliotibial hand friction syndrome. This improvement was maintained out to 8 years after surgery.

During iliotibial Z-plasty, two transverse cuts are connected with a longitudinal cut in the iliotibial band. This creates two independent strips that slide approximately 1 .5 cm relative to each other

II Free Paper

REPAIR OF THE ROTATOR CUFF. VS Pai M.S(Orth), Dip. Nat Board (Orth), M.Ch(Orth); David Anthony Lawson FRCS (Orth), FRACS(Orth)

Abstract

The literature related to prognostic factors in rotator cuff repairs is confusing. Younger patients have done better in some reports.[1] Early repair after an injury has been associated with increased strength and decreased pain.[2,5] Small tears have tended to do better.[3,14] Patients with weak abduction and limited movement have done poorly.[8] In most of the above series, however, statistical significance of these relationships was not achieved.

The purpose of this prospective study was to look at the results of rotator cuff repair done at a district hospital by a single orthopedic surgeon and to determine prognostic factors such as age, duration of symptoms, preoperative treatment, size of tear and quality of the tendon. The study was designed to minimize variability in operative technique or postoperative rehabilitation, and we used standardized assessment criteria and follow-up time so as to limit their influence on the final outcome.

METHODS AND MATERIALS

This prospective study reviews 60 consecutive patients who were brought forward for surgery for a full-thickness tear of the rotator cuff. All patients were treated between 1994 and 1997 in Princess Alexandria Hospital, Napier, New Zealand by one surgeon (DL) and one anesthetist. An independent observer (VP) performed their final assessment in July 1999. Of the 60 initially enrolled, only those 54 patients (58 tears) with a complete full-thickness tear confirmed at operation were included in the study. Five cases were excluded because of inadequate follow-up and there was one death that was unrelated to surgery.

At the time of repair, the mean age of the patients was 65 years (range, 32 to 82 years). Eight operations were performed on patients aged between 32 and 50 years; 25 operations on patients who were between 50 and 70 years and 21 operations on patients over 70 years. There were 34 men and 20 women. The mean duration of pain before surgical intervention was nine months (range, 3 to 24 months). The dominant arm was affected in 40. In 4 cases, rupture was bilateral.

At the time of surgery 66% of the patients had night pain, 100% had pain with activities of daily living, and 25% had pain at rest. Thirty-one complained of weakness, and 43% had clicking or grinding. Forty-seven of the patients had sustained an injury to the shoulder (a fall in 18, exertion such as lifting in 26, a direct blow to the shoulder in 3). Many of these patients reported that they had had mild symptoms in the shoulder prior to injury. There were no associated fractures in the patients with an injury, but one patient had had a dislocated shoulder.

The impingement sign described by Neer[22] or Hawkin[15] was consistently present (Table 1). The “drop arm sign” was present in only 15 patients. Passive shoulder motion was usually well-maintained, whereas active motion was less than 120° in 18 patients. All patients had pain on resisted abduction or external rotation. A painful arc was present in the coronal plane between 60° to 120° in 49 patients. In 7, there was clinical evidence of biceps tendon rupture.

Radiological examination was performed on all patients. The study was normal in 22 patients, and in the rest more than one of the following findings were present: sclerosis of greater tuberosity, cystic changes, squaring, decreased acromio-humeral space and osteo-arthritis of the acromio-clavicular joint. Preoperative scapular outlet views were not done in any of the patients; therefore the acromial architecture as described by Morrison and Bigliani[20] was not evaluated.

In most cases diagnosis was confirmed by an ultrasound or an arthrogram, or both. In 2 patients clinical evidence of cuff tear was sufficient and further imaging was not performed. There were 4 false-negatives with ultrasound and 1 with arthrogram in this series.

Each patient received a minimum of three months' conservative treatment which included aggressive physical therapy, emphasizing stretching and rotator cuff strengthening exercises, anti-inflammatory medication, selective steroid injection, and avoidance of pain-inducing activities. The primary indication for surgery was relief of pain. Functional improvement of patients was a secondary goal.

A superior incision (centering on the lateral border of the acromion) and a deltoid-splitting approach (less than 4 cm), with the patient in a beach-chair position, was used in all cases. An anterior acromioplasty as described by Neer[22] was always performed, combined with the excision of any bony prominence on the undersurface of the acromio-clavicular joint. Ancillary procedures included distal clavicle excision in 11 patients, biceps tenodesis in 3 and repair of the coraco-acromial ligament in 6 cases of massive rupture. The distal end of the clavicle was excised if inferiorly projecting osteophytes, which could contribute to impingement were found at operation. Repair of the rotator cuff was accomplished by direct (side to side) suture in 19, and the ends of the torn cuff were sutured to a trough created in the humerus in 37. The repair was achieved by considerable mobilization in 21 patients. The site of reattachment was usually in the sulcus adjacent to the humeral articular surface; very rarely when the tendons did not reach their original anatomical attachment without undue tension, the trough was made somewhat more medially.

The size of the cuff tear was determined by the width of the avulsed tendon at its insertion. These were classified at surgery according to Post and Silver[23]: small tears are less than 1 cm in diameter, medium tears 1-3 cm, large tears 3-5 cm, and massive tears are greater than 5 cm in diameter. There were 17 small tears, 20 moderate tears, 8 large tears and 13 massive tears. In 41 cases, only the supraspinatus was torn while in 7, all three cuff tendons were torn. In the remaining patients, a supraspinatus tear was associated with tear of either subscapularis or infraspinatus.

Tendon quality was rated as good, fair or poor, based on the criteria of Iannotti.[16] A good-quality tendon had a thickness greater than or equal to 4 mm. In a fair-quality tendon, the cuff was thinned out, but when the suture was tied, there was no visual tendency for further tearing or pullout. Poor-quality tendons did not possess these characteristics. Nine patients had an associated rupture of the biceps tendon. The surgical findings are summarized in Table 2.

Postoperative treatment was similar for all patients. An abduction brace was used for 6 weeks in all cases where the tendon was repaired to bone. The 21 patients who had side-to-side repair performed Codman's exercises in a sling or a collar-and-cuff. Passive ROM exercises were begun on the first postoperative day. Active exercises were started at 6 weeks. Resistive strengthening was begun when active motion was comfortable.

All patients were followed for over a year at 3, 6, and 12 weeks, 6 months and 1 year by the operating surgeon. Examination of each patient at final follow-up was performed by an independent surgeon (VP) using the UCLA[8] (University of California at Los Angeles) End Result Scores and a modified Constant's Functional Score rating scale.[6] These rating scales evaluate pain, function, movement and patient satisfaction. Manual muscle testing of abduction and forward flexion of the shoulder was performed, and muscle strength was classified according to the MCR grade. When strength was compared with that of the opposite, asymptomatic shoulder, 25 points were assigned if the strength was normal (Grade V), 20 points if strength was Grade IV, 10 points for Grade III and none for muscle strength less than grade II. Results were analyzed using shoulder functional scores as described by Constant et al[6]: Excellent (80-100), Good (65-80), Fair (51-65), Poor (50). They were further analyzed with the UCLA system (Ellman[8]): Excellent (34-35), Good (28-33), Fair (21-27) and Poor (<20). There were 32 patients who were followed up over 3 years and 26 over 2 years.
The prognostic factors such as age, duration of symptoms, preoperative treatment, size of tear and quality of the tendon were analyzed against results using only UCLA system.

Statistical analysis

Statistical analysis was performed on the collected data with the use of MINITAB statistical software. Multivariate analysis was done using chi-square tables with a significance level of $p<0.05$. The variables evaluated included age, duration of symptoms, preoperative movement and muscle strength, tear size and quality of tendon.

RESULTS

Functional results

The results were graded on the basis of pain, function, amount and strength of flexion, and patient satisfaction. Table (3) shows a comparison of the two different rating systems. Forty-eight (83%) were graded Excellent or Good according to the Modified Constant's ratings system compared to 44 (76%) graded Excellent or Good using the UCLA criteria.

Correlation of duration of symptoms with the functional results

In 26 patients, symptoms had been present for more than a year prior to surgery. There was no significant difference between the duration of symptoms in those patients who had a satisfactory results as opposed to an unsatisfactory outcome (Table 4).

Correlation of the patient's age with the functional result

Tears in elderly patients (=70 years) were repaired successfully: 18 cases of 23 had good to excellent results in this group (Table 5). We found no significant correlation of poor outcome with old age.

Correlation of preoperative ROM and muscle weakness with the functional results

Patients whose preoperative abduction was less than 90° had a higher risk of having an unsatisfactory result, and this was statistically significant (Table 6). Twenty-two patients had preoperative weakness in the shoulder and were found to be less than grade IV on the MRC scale. Thirteen of these 22 had a

fair to poor outcome, indicating that patients with weak abduction preoperatively were more likely to have unsatisfactory results (Table 7).

Correlation of the tear size with the functional results

The size of the rotator cuff tear did not appear to have a significant effect on the outcome obtained in-groups I,II and III. However 6 of 12 massive tears (Group IV) had a fair or poor outcome, and this is statistically significant compared to groups I-III (Table 8).

Correlation of the quality of rotator cuff with the functional results

Shoulders in which the repaired cuff was of good quality at the time surgery had significantly better function than those with a poor-quality tendon (Table 9)

Complications

Superficial infection was seen in 2 patients. This resolved with 2 weeks' oral antibiotics. One patient had a stiff shoulder which was manipulated at 3 months and one had minor reflex sympathetic dystrophy (Complex Regional Pain Syndrome), which responded to a single guanethedine block. Two patients had transient ulnar nerve palsy, which resolved on observation (in one case the nerve involved was on the contralateral side).

.Seven of the poorest results were analyzed separately. All were patients over 60 years, in 4 cases, symptoms had been present for over 12 months, in 6 cases there was a massive tear and poor quality of the cuff tendon, and 5 cases required significant mobilization of the tendon.

DISCUSSION

Many reports in the literature have confirmed the satisfactory results of open surgical repair of full-thickness rotator cuff tears .[8,14,21,22,25] Although symptomatic rotator cuff tear is a common problem and can be quite disabling, there is a tendency to treat this problem non-operatively in many county hospitals where there is no specialized shoulder unit. There is also some reluctance to operate on elderly patients based on the expectation that surgery may not be suitable and the outcome will be poor. Many researchers used either arthrogram[4], ultrasound[10,12] or MRI[27] to evaluate rotator cuff repair postoperatively. It is our opinion that both the UCLA and Constant's functional scoring systems are reliable and practical to use in the clinical situation. In this series, we achieved excellent-good results of surgical repair of cuff tear in 76% according to the UCLA scoring system, and 83% with a modified Constant's score. A subjective assessment showed that all but 5 patients considered themselves to be improved after surgery. Although 95% of the patients complained of severe pain preoperatively, only 10% had pain at the follow-up evaluation.

A mean follow-up of 34 months allows only a short-term clinical evaluation of rotator cuff repairs. It was proposed in previous studies[1,28] that the results did not deteriorate over time. Hawkins[14] et al. reported that the operative results in their patients had not changed one year after surgery. Thirty-two patients in the present series were in fact followed for 2-4 years. Patients rated excellent-good at 1 year remained excellent-good throughout the follow-up period, indicating that most re-ruptures occur during the first 12 months.

Although not uniformly reported, many clinical factors influence the result of a rotator cuff repair. Several points derived from this study deserve emphasis.

Influence of age

There have been mixed reports. Cofield[5] concluded that the patient's age was a significant factor in predicting outcome; older patients had more significant disease and poorer outcomes. Our own figures showed that, although larger tears and poorer results were more frequent, excellent-good results were achieved in 78% of patients over 70 years. This suggests that age should not be the main factor in decision-making for surgery. Even a little improvement in pain and ROM in this age-group can make lot of difference to the patient and a gratifying outcome can usually be anticipated. Hattrup[13] reported somewhat similar results and obtained excellent or satisfactory results in approximately 90% of his patients older than 65 years.

Influence of duration of symptoms

Although much controversy surrounds the timing of surgery, few studies have actually definitively examined this variable as it pertains to surgical outcome. Because most rotator cuff tears are chronic and not related to single-event trauma, it is difficult to define a critical reference point from which to measure the timing of surgery.

Some surgeons have advocated early repair of rotator cuff tears [3,5,23]. All patients in our study had a chronic tear and no patients were operated on within the first 3 months. In over half of our patients, repair was delayed more than 6 months after initial symptoms. There was no significant relationship between the time to surgery and the final outcome in our data. This study demonstrated that satisfactory results can be obtained with delayed repair.

In an effort to determine the cost effectiveness of rotator cuff repair surgery , the treatment costs were analyzed for surgical treatment and physical therapy[26]. It was concluded that immediate referral of rotator cuff tears for specialized care results in decreased cost and earlier return to work. **We** do not agree that this is necessary in all cases of cuff rupture but feel earlier surgery is indicated in the younger age group with weakness of abduction and limitation of ROM as these patients were unlikely to do well with physiotherapy. Early repair is helpful in allowing early return to work.

Influence of preoperative ROM and muscle strength

The literature is divided over the predictive value of preoperative strength and motion, with some authors finding no prognostic value[9,11,23] and others finding useful information[8,14]. Some studies have shown that weakness in abduction and external rotation actually correlated with rotator cuff tear size[5,14]. We agree with the previous studies[8,14] that pre-operative limitation of movement below 90° abduction and weakness below grade IV in abduction and external rotation increased the risk of a poor result.

Influence of size of tear and quality of cuff

Although the size of the tear did not affect the operative result in some reports[12,18,19], recent reports[3,5,16] do suggest that it influences the functional outcome. It has been reported that larger cuff tears were

associated with poor-quality of the tendon tissue, the presence of a rupture of the long head of the biceps, and difficulty of tendon mobilization and repair[3].

In contrast to previous observations[3,23], our results do not support the concept that, when massive rupture is excluded, the size of the tear is the major determinant of the strength of abduction and external rotation at the time of follow-up. However, unsatisfactory results were associated with both massive tears and poor quality of the cuff tendon, and these findings were statistically significant.

Rockwood and Burkhead[24] described 58 patients with a massive tear who underwent open acromioplasty and rotator cuff debridement. They reported 95% having relief of pain and 90% having increased strength after a specific rehabilitation program. They have not reported the long-term outcomes. Our results in massive tears were as efficacious for pain relief, but functionally inferior. Despite this fact, it is our opinion that in all massive ruptures repair should be attempted, because although not proven, it appears that repair of the rotator tendon and coraco-acromial ligament may help in preventing progression to rotator cuff arthropathy[15].

It has been well reported[10,12] that the major determinant of the outcome of an operative repair of a tear is the integrity of the rotator cuff at the time of follow-up and the size of the post-operative defect. This was not assessed in the present study.

We agree with previous reports[1,8] that subjective assessment with manual muscle testing is both practical and reliable. However, the importance of isokinetic testing of shoulder strength in postoperative evaluation may be preferable when available[19]. We were unable to perform comparative isokinetic studies in our patients.

The need for concomitant procedures with cuff repair did not jeopardize the result, and they should be performed when indicated. The use of an abduction brace to relax the tension on the repair also did not cause poorer results, although some patients could not tolerate bracing.

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III Notes: ACL

ACL

History

Injury mechanism

70% Non-contact

30% contact injuries

Pop in 40% of cases

Early swelling of the joint due to hemarthrosis in all cases

Mechanism

Hyperextension: Combined ACL and PCL

Dashboard: PCL

Hyperextension with varus and valgus: ACL [contact in soccer]

Sudden deceleration, abduction and external rotation [Non-contact]

Isolated or combined. Laxity in 0º is significant. It means, ACL is not isolated injury.

More common in young athlete more so in women

Lax joints

Valgus knee

Hormonal

Small notch

Examination

1. Instant Swelling
2. Lachman's test: Very sensitive [check under clinical examination of the knee]

May be difficult to elicit in acute situation

3. Anterior Drawer test [foot in neutral]. More than 1 cm translation is significant
4. Pivot test is strongly suggestive of ACL deficiency. It is better appreciated under general anaesthesia

X ray

1. Segond's Fracture

Chip fracture due to avulsion of the capsule on the lateral side.

Seen in 10% of ACL rupture

Common site is middle of lateral capsule

2. Chronic ACL

Prominent intercondylar osteophytes

MRI:

Normal Parallel striations ''fanlike'' configuration

ACL smaller than PCL

J shaped PCL

ACL fibers are normally oriented parallel to

to Blumensaat's line, inclining about

55º from the tibial plateau

Torn: Discontinuous usually in one sagittal view;
Increase signal in T2, "Laying down"
Angulation of PCL due to subluxation of tibia
Osseous bruise: Posterolateral tibia and
anterolateral femoral
95% accurate

Arthrometry

KT 1000.

3mm differences with opposite side is significant

NATURAL HISTORY OF NON-OPERATIVE TREATMENT

1. Natural history of the ACL-injured patient remains controversial

Noyes: 1/3 : Pain and instability
1/3 : No symptoms in sports or ADL's.
1/3: Fine with modification

Hawkins: 87% fair to poor results
14% returned to athletic activity

2. Untreated ACL in active patients

Progress to Osteoarthritis, rotary instability, Meniscal tear

3. Recurrent give way symptoms are well correlated with osteoarthritis

4. ACL reconstruction: Instability is controlled better
However, has not shown to decrease osteoarthritis

5. Risk for requiring surgery is more in highly active patients

6. Increase incidence of Medial Meniscal tear in chronic situation.[cf. in acute ACL rupture, Lateral Meniscal tear is more common.]

TREATMENT

Hamstring exercises

Isometric quadriceps exercises

ROM exercises

INDICATIONS FOR SURGERY

I. **Activity level**

International Knee Documentation Committee [IKDC]

I	soccer base ball
II	Heavy manual or tennis or Ski
III	Light manual or non-cutting sports, jogging
IV	Sedentary

I and II ACL rupture always need surgical reconstruction

III and IV Brace or +/- surgery

2. **Age**

Older patient previously considered relatively contra-indicated.

But recently results are as good as in young patient

3. **Children**

Conventional reconstruction surgery may damage the growth plates

Activity restriction is impractical

No problem with skeletal age of 14

Tranepiphyseal grafts and soft tissue tendons are used in younger patients [<14 years]

4. **Females:** factors may predispose failure

1. Female athlete
2. Lax joint
3. Narrow intercondylar notch
4. Torsional deformity

Historical Surgeries

1. **Primary repair**

Suggested by O Donogue in 1950 and Marshal: Bound to fail

2. **Primary repair with augmentation**:

With lateral extra-articular reconstruction [Macintosh or Ellison: using ITB]. Long strip of Iliotibial band which remains attached to Tibia is passed under lateral collateral ligament and through the intermuscular septum and then suture back again

3. **Prosthetic Replacement**: 80% failure at 15 yrs. Wear debris related problem.

CONTEMPORARY SURGERIES

1.Reconstruction of ACL using patellar tendon or hamstring using open or arthroscopic method

2. Allograft: Valid alternative to autograft

Freezing : do not weaken the graft [<25 rads]

Become vascular and viable with time

Rate of incorporation is slower than autograft

Timing

Earlier than 2 weeks: high chance of arthrofibrosis

Majority: within 2-6 weeks

Left too long: Secondary changes in the menisci and cartilage

Patellar Tendon Graft

Advantages

2900 N

Rigid fixation of the graft is possible

Good preservation of stiffness

Early incorporation and ? return to sports in 3 months

Disadvantages

Ant Knee pain

Patellar tendonitis

Rupture of the patellar tendon

Increased joint stiffness

Late chondromalacia

Operative

Bone patella bone reconstruction

I. **Diagnostic Arthroscopy**

Antero-lateral portal for arthroscope placement

Antero-medial portal for working portal.

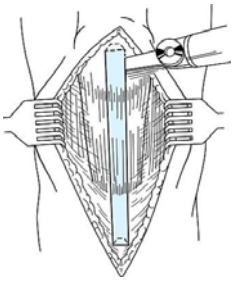
Check menisci for tear [Medial meniscus in Chronic situation and lateral is common in acute]

Repair big tears and nibble small tears.

II. **Graft Harvest**

Knee in 90º flexion

Incision Tip of the patella to 2 cm below the tibial tubercle



Graft size Mid 10 mm of the ligamentum patella and

25 mm of patella and tibial tuberosity

Oscillating saw: 1 cm depth to create bone plugs;

Check the size: 10 mm cylinder

Nibble to achieve bullet end and take the soft tissue

Tension on the tendon

At each end 2 drill holes. 1 and 2 cm proximal to the end

Each end is fixed with 5 Trichon

III. **Notch preparation**

Remove the remnants of ACL

The notchplasty : not always required [only when impingement of the graft in full extension]

IV. Femoral Preparation

Clear the soft tissue from the lateral wall of the notch.

Resident ridge: Avoid misinterpreting a vertical ridge two thirds posteriorly as the true posterior outlet.

H**ook a probe** over the posterior edge to check “over-the-top” positioning.

Femoral tunnel

At the 1 o'clock position in the left knee and 11 o'clock position in the right knee

7 mm anterior to the posterior margin

Pass a guide wire first with knee in full flexion

5 mm cannulated drill to come out through the lateral cortex

[Avoid cortical blow out. When blow out: use endobutton.]

Ream with a 10-mm reamer 2.5 cm into the femur, creating an "endoscopic footprint."

V. **Tibial Tunnel**

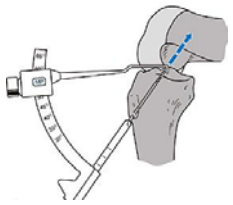
Make a medially based rectangular periosteal flap just medial to the tibial tubercle

The tibial tunnel: 1.5 cm medial to the tubercle, 1 cm proximal to the pes Anserinus

Tibial tunnel guide systems: 45º and should emmerge at the site of ACL attachment

Several parameters to determine guide pin placement

1. ACL foot print: posterior 1/3rd of the foot print
2. Posterior edge of the anterior horn of the lateral meniscus
3. Just lateral to the medial tibial spine
4. Last, the guide pin should enter the joint **7 mm** anterior to the PCL



Once drill position is confirmed then use 10 mm cannulated drill. Remove loose bone and cartilage around the tunnel entrance with the shaver, and smooth posterior ridges of the tunnel

VI. **Femoral side fixation**

Pull the nylon loop of the graft through the tibial tunnel

"Push up" the graft through the tibial tunnel

Direct the graft through the femoral tunnel

7mm x 25 mm titanium fully threaded cannulated interference screw on the femoral side.

Face the cortical surface posterior and cancellous anterior

Divergence angle should be less than 20º

VII **Tibial side fixation**

Cortical side of the graft [cf. femoral side]

Flex the knee from 100° to complete extension or hyperextension.

Cycle the knee several times with tension placed on the graft.

Fix the tibia with guide wire lateral and fix with 9 or 10 mm x 25 interferential screw

Misplacement of the graft tunnels

Graft placement: More anterior in the tibia: Extension will be limited

More anterior in the femur: Flexion will be limited

VIII Post operative

Hinged knee brace locked at 20 of knee flexion [relaxes ACL]

Non weight bearing for one week

After 1 week, patients begin range of motion therapy

Progressively bear weight as tolerated.

After nearly full range of motion is achieved, patients start strength training, with the emphasis on closed kinetic chain exercises.

Close chain is preferred than open chain as it exerts less shear force

Sports after 6months

1. Isolated ACL in Athlete	Reconstruct ACL
2. ACL with Medial collateral ligament	Reconstruct only ACL and ROM brace for 6 weeks
3. ACL with Posterolateral instability	Repair PL corner + ACL reconstruction Staged or single sitting
4.ACL + PCL	Reconstruct both same or different sitting

Hamstring tendon

Advantages

Strong and can withstand 4100 N

Greater cross sectional area of tendon

Small incision

Low post operative morbidity

Less donor site morbidity

Disadvantages

Slower tendon to bone healing. Longer time to incorporate

Weakness of the hamstrings

Widening of the tunnels: windshield

1. Occupation: Job with kneeling avoid PTG [carpet layers, Tile layers]

2. Technical difficulties: Hamstring is easier than PTG

3. Compliance: Hamstring graft requires less supervision

4. Open growth plate: Hamstring tendon reconstruction is preferred

5. Time to return to sports: Quicker with Patellar tendon than Hamstring

Open or Arthroscopy: Clinically not much different

Steps

Graft harvest

Notchplasty

Femoral tunnel

Tibial tunnel: Posterior foot print of ACL or 7 mm anterior to PCL

Graft passage

Femoral fixation: 11 Right knee and 1 in the Left knee

Tibial fixation

Fixation: End button for Hamstring for femur
Interferential screw for tibia

Graft harvest

A longitudinal 3 fingerbreadths below the joint and 2 medial to the tuberosity

Incise the sartorial fascia overlying the borders of the gracilis and semitendinosis.

Do not divide MCL.

Identify the gracilis and semitendinosus tendons beneath the sartorial fascia.

Tendons: Detach or fixed to the tibia

Harvest the gracilis tendon first

The leg in a figure-4 position

Place traction on the gracilis sutures and palpate around the tendon for fascial slips

The gracilis is proximal to the semitendinosus, and the saphenous nerve crosses the gracilis at the posteromedial joint line.

A consistent semitendinosus fascial band arises 7 to 9 cm proximal to the tendon's tibial insertion and inserts into the medial gastrocnemius fascia.

These fascial band should be release before using the stripper

One should be able to harvest more than 24 cm of tendon,

Strength of different grafts

	Ult tensile load[N]	**Stiffness [N/mm]**
ACL	2160	242
Doubled ST-G	4140	807
Bone pat tendon bone	2977	455
B PTB Frozen	2552	633
BPTB 3 MRad	1990	531

Anterior knee pain:

25% in STG

75% with PTG at one year. Usually mild

Prospective study: ST-G Vs PTG: at one year

Both grafts showed 10% quad power loss

Hamstring showed 10% flexion in addition

Allograft:

1. Viral infection: 1:600000
2. Deep freezing superior to freeze thawing
3. Gamma irradiation [2.5 mRAD]

Indications for allograft

Used mainly for revision or when multiple grafts are required for complex instabilities

Multiple ligamentous injury

Fixation method

Interference screw Endobutton

Various parameters for graft fixation:

1. the length and diameter of the screw,
2. its divergence,
3. the size of the bone block compared with that of the tunnel,
4. the geometry of the bone block,
5. the torque of insertion of the screw, 6. the BMD.

Pomeroy : the effect of interference fit on different lengths of bone plugs with interference screws and showed no difference in fixation with longer plugs.

Results

ACL reconstruction: 10 yrs

with menisci intact gives 87% Good to excellent results

with Meniscectomy gives 63%

Randomised controlled trial of patellar tendon v hamstrings

Both groups 10% loss of quadriceps power.

Hamstring group 10% loss hamstring power at 1year

Special Circumstances

1.Medial OA with ACL deficiency

High tibial osteotomy is theoretically the best choice since, as well as offloading the medial compartment, this osteotomy tends to reduce the tibial slope and so lessens anterior directed stress on the proximal tibia.

The controversy is as to whether or not simultaneous ACL reconstruction should be performed.

2. **ACL in Children**

Incidence is rapidly increasing

High incidence of secondary meniscal injuries

High osteoarthritis when allowed high level athletic activities

Risk of surgery is sometimes of lower risk than repeated injury

Children older than 14 years can be treated like adults

Problem in immature children [Tanner I & II]

In children the options are

a. Activity modification

b. Brace

c. Extra-articular reconstruction

d. Total transepiphyseal [present trend should be performed pediatric orthopedic surgeon]

Problems: Growth plate

Compliance

Non-isometry

4. Contemporary procedure is transepiphyseal grafts

Autogenous hamstring grafts: graft of choice

Contention: Centrally placed tunnel usually does not cause growth problem and if when it interferes it does not cause angular deformity

Replacement of the ACL is a technically demanding procedure

Can be performed in prepubescent patients with safety

Should be attempted only by accomplished knee surgeons.

The use of an Endo Button or similar device

3. **Revision ACL [Graft rupture]**

Issues: malalignment of the tunnel

Graft: Hamstring or Contralateral knee graft or allograft

4. **Bucket handle tear of the meniscus with ACL tear**

Reported that the incidence of meniscal tear is over 50% [16-80%]

Early cases it is easy to repair meniscus in selected cases

Patterns:

Acute: Lateral [56%] and Medial [44%]

Chronic: Medial [70%] and Lateral [30%]

Present recommendation is staged procedures.

Meniscal repair or meniscectomy.

Once knee motion: a second-stage procedure for ACL reconstruction

5. Grade III chondromalacia with ACL

Hamstring reconstruction is preferred

Complications

1. Arthrofibrosis

Shelborne: Arthrofibrosis 4 types

I Extension loss <10º with normal flexion

II >10 º with normal flexion

III >10 º with loss of >25 º flexion loss

IV >10 º and >30 º with patella infera

Tunnels:

Femoral tunnel: 1-2 mm from the posterior interocondylar region at the 11'o' clock in the Right and 1'0' clock for the Left Knee

Tibial tunnel: at the foot print of the native ACL.

If the graft is placed anterior to the ideal placement in the tibia it causes limitation of extension and if it is placed to anterior in the femur it causes limitation of the flexion.

2. **Fracture of Patella**:

Bone weakens following graft harvest

More in small patella in women

3. **<u>Cyclop lesion:</u>**

Limits extension.

Scar from retained ACL

4. **<u>Graft fixation</u>**:

Interference screws can be dangerous if used incorrectly

Should be inserted at correct angle

Graft must be taught when screw is inserted

5. **Ant Knee pain**:

more with Patellar tendon graft than in Hamstring transfer

[10% in recent study same in both surgery

6. Femur fracture

7. Rupture of the graft

8. Widening of the tunnel

High incidence of tunnel widening with greater incidence in hamstring group.

It is possible there is increase movement of the graft in the tunnel.

Cause: ? Bungee effect.

Tunnel widening is not due to method of fixation. [Clateworthy]

8. **Sterility of the graft**

When the graft dropped on the floor at the time of preparation the sterility is lost.

Sterilise the graft:

3 solution: 10% Povidone Iodine

Or 4% Chlorhexidine

Or Triple antibiotic [Gent; Clind, Polymyxin]

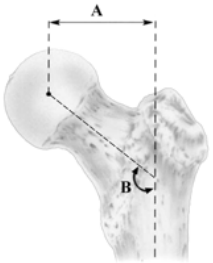
Presently: 30 mnts in 4% Chlorhexidine followed by 30 mnt in Triple antibiotic

IV Current concepts

Soft-Tissue Balancing of the Hip; Greenwald, Morrey, Rorabeck, **86:1078-1088 (2004)**

Charnley: restored femoral offset by medializing the acetabular component, avoiding excessive anteversion of the femoral component, completing the femoral neck osteotomy at an appropriate level, maintaining a 135° neck-shaft angle, and, when indicated, advancing the greater trochanter[5]

The simplest and most frequently used measurement of femoral offset is the perpendicular distance between the center of the femoral head and a line drawn down the center of the femoral shaft . Traditionally, total hip implants have had a relatively high neck-shaft angle, averaging 135° [normal hip: the mean angle of the "normal hip" to be closer to 125°]



What happens if Offset not restored?

1. Compromised abductor function ➔ Limp
2. Increased resultant forces across the hip joint

Sakalkale et al.[13] compared polyethylene wear between sides in seventeen patients with bilateral replacement . At 2 yrs:, the linear wear rate 0.21 mm/yr for the standard-offset components and 0.01 mm/yr for the high-offset components.

3. Stability: Dennis et al. concluded that the soft-tissue envelope that surrounds the hip exerts a resistive force that prevents the femoral head from subluxating within the acetabulum.

4.Decrease the prevalence impingement

Femoral Offset:

50 THR, Davey[19] made **standard radiographs of the hip**, applied templates, and measured femoral offset after adjustment for magnification. The average offset was 43.9 mm, but the range was 27 to 57 mm

A number of factors determine the amount of offset of the femur.

1. Large femora tend to have more offset than smaller ones.
2. Varus neck tend to have greater femoral offset. [Noble]
3. Length of the femoral neck

A decrease in femoral offset medializes the locus of the abductor muscle insertion, decreases the abductor moment arm, and therefore increases both the resultant force across the hip joint and the energy required for normal gait.

This inturn cause wear and loosening [Sakalkale].

It has been theorized that the displacement of the femur with reference to the socket and pelvis that occurs with increased femoral offset increases motion. This lessens the likelihood of impingement and thus provides a second explanation and basis for enhanced stability[6].

Davey: When the femoral offset was increased by 10 mm, the abduction force decreased by approximately 10% and this was associated with a 10% decrease in force transmission at the acetabulum. These results concur with Charnley's biomechanical calculations regarding offset[5].

Implant designs

An anatomic study of the proximal part of the femur indicated that if a prosthetic implant system has a single neck-shaft angle, up to 67% of patients will not have accurate restoration of the biomechanical center of the hip or femoral offset[23].

Furthermore, it was noted that eight different neck-shaft angles would have to be available to restore the anatomy accurately in only 50% of patients. The inference of this finding is that a greater variety of implant sizes might be necessary in order to restore proper hip balance.

Effects on Prosthesis

The strength of the prosthesis is

1) type of metal alloy,
2) geometry, +/- porous coating, size, and modularity.
3) Increasing offset increases the bending = # Prosthesis
4) Increase offset: contribute to increased micromotion ➔

can affect bone ingrowth and the longevity of fixation of both cemented and cementless hip replacements.

[Micromotion: Cementless: 38.3 µm with an offset of 28 mm to an average of 75.0 µm with an offset of 53 mm

Cemented:f 15.0 µm with an offset of 28 mm to an average of 23.5 µm with an offset of 53]

Increasing femoral component offset reduced the hip abductor force and hip reaction force but did not significantly affect bone strains. Radiographs showed no changes in the specimens with an increased-offset implant compared with those with a regular-offset component. Bone ingrowth also was not adversely affected by an increase in femoral offset. These biomechanical studies support the use of an increased-offset femoral component with cementless fixation.

How to increase femoral offset

1. **Increasing Neck Length**

Increasing the length of the femoral neck or head increases the resting length of the hip abductors and, depending on the angle of the femoral neck, increases their contractile efficiency while concomitantly lengthening the abductor lever arm. Unfortunately, an increase in the neck length also increases the limb length, resulting in a limb-length discrepancy. This is an undesirable clinical outcome in most cases

2. Decreasing Neck-Shaft Angle

Decreasing the neck-shaft angle reduces the height of the femoral head, and thus the limb length, while increasing offset. This construct directly increases the magnitude of the abductor lever arm. It also has the positive effect of increasing abductor tension, making the muscles more efficient. The

greater varus neck-shaft angle results in an increased torsional (or out-of-plane) force that tends to rotate the femoral component, especially with activities involving load transmission during hip flexion and extension such as stair-climbing.

3.Medializing the Femoral Neck While Concomitantly Lengthening the Femoral Neck (Dual or High-Offset Femoral Components)

. [high-offset femur: medialize the neck to vary offset. This geometry maintains the neck-shaft angle relationship while concomitantly restoring offset]

Dual or high-offset femoral components either vary the neck-shaft angle of the implant or medialize the neck to vary offset. This geometry maintains the neck-shaft angle relationship while concomitantly restoring offset. A major advantage of this technique is that it can be used to enhance abductor tensioning without substantially affecting limb length

Trochanteric Osteotomy

In this instance, offset is defined as the distance from the center of the head to the attachment of the abductor muscles or as the perpendicular distance from the center of the head to the line of action of the abductor muscles. Since this definition differs from the usual definition of femoral offset, it may better be termed *abductor offset*. This lessens the likelihood of wear and loosening. However, the procedure does not improve motion or lessen the likelihood of impingement.

5. Acetabular Component

Modular "offset" or "lateralized" liners have been shown to increase offset while preserving limb length. The offset may be altered by modifying the relationship of the articulation at the socket so that the center of rotation at the hip is translated both laterally and inferiorly[2]. A laterally displaced socket increases the abductor tension, which is a desirable outcome. However, it also increases the body weight lever arm (Fig. 2), which is considered an adverse outcome.

Accordingly, lateralized liners are typically employed when the surgeon has tried a high-offset femoral component but additional offset is needed in order to restore the abductor tension and thereby enhance hip stability

Authors preferred method

Preoperative Templating

Templating the contralateral, "normal"

X ray: AP pelvis, AP centered at hip in 20* internal rotation and a lateral

When a patient has had a previous fracturedislocation of the acetabulum, Judet radiographs and/or computed tomographic images should be made to assess the location and degree of bone loss and fracture healing.

Center of rotation of the joint. The basic principle of templating is to reproduce the "normal" anatomic center of rotation and restore femoral offset while maintaining equal limb lengths.

Limb Length

There are several methods with which limb length can be measured radiographically. Two of the more common techniques will be described.

The first method consists of drawing a horizontal line through two points located at the inferior aspect of the ischial tuberosities.

II Method: a horizontal line can be drawn between the inferior aspects of the acetabular teardrops, which may be more reliable points of reference than the ischia.

A vertical line is then extended perpendicularly from the horizontal reference to the estimated center of each femoral head. The difference in length between the two vertical lines ("A" – "B") represents an estimate of the limb-length discrepancy.

Alternatively, two lines can be drawn through the center of the lesser trochanter of each femur and parallel to the ischial line. The net difference in height between the lesser trochanter and ischium or femoral head and ischium is then measured.

Finally, all measurements should be reduced by a factor of approximately 20% to account for the enlargement of the osseous anatomy on the radiographs[28]. Therefore, in this example, increasing the neck length in the affected right hip by the distance "A" – "B" and then multiplying this value by 0.80 (to account for the 20% magnification) should equalize the limb lengths (Fig. 9).

It is important to note that, although radiographs are useful adjuncts for determinations of limb lengths, radiographic measurements should be adjusted on **the basis of the findings of the relevant clinical examination.** For example, a **unilateral adduction contracture** will result in a perceived increase in limb length on the affected side, whereas a fixed flexion contracture tends to result in an overestimation of any shortening that may be present. Furthermore, patients with **fixed pelvic obliquity** tend to have overcorrection or undercorrection as a result of an alteration in the relative positioning of the osseous landmarks used for templating and determinations of limb lengths**. Accordingly, one of the most important questions that the clinician should ask** the patient is what is his or her perceived limb-length discrepancy (if any)[3]

Acetabular Component

Templating typically is begun on the acetabular side of the joint with the more normal hip used as a reference. The orientation of the acetabular shell is typically 45° relative to the horizontal plane (on the anteroposterior radiograph) and in approximately 20° of anteversion (on the lateral radiograph). The apex of the acetabular component should be positioned just lateral to the teardrop.

An appropriately sized acetabular component should be covered at its superolateral margin by host bone with avoidance of excessive overhang or underhang. Finally, if the acetabular component is to be fixed with cement, one should allow a minimum of 2 mm between the acetabular template and the host bone to allow for an adequate cement mantle. The template that satisfies all of these criteria is then selected, positioned, and marked at its center, which will represent the new center of rotation for the joint.

Femoral Component

After the center of rotation of the acetabular component has been established, the femoral template is superimposed on the radiograph. **An anteroposterior radiograph with the femur internally rotated approximately 2**0° (so that the true neck-shaft angle is in the same plane as the radiograph) provides the surgeon with the most representative view of the proximal femoral anatomy. The optimal component size is then established from the radiograph by matching the geometry of the implant to that of the host bone. The various implant designs will influence the type and size of the components that are selected.

For example, for cemented femoral prostheses, **a minimum of 2 to 3 mm of cement mantle** is required to provide adequate fixation

Proximally coated implants, metaphyseal fit and fill are of greatest importance. Moreover, the manufacturers of extensively porous-coated prostheses advocate a minimum of 4 to 5 cm of cortical interdigitation or "scratch fit" to obtain adequate torsional stability and minimize subsidence.

Once the appropriate type and size of femoral component have been determined, the template should be positioned so that it is parallel to the anatomic axis of the proximal part of the femur, with particular care taken to avoid varus or valgus malalignment.

If no limb-length discrepancy is present, the surgeon should align the center of the appropriate femoral head template with the anticipated center of rotation previously marked on the radiograph. However, if the affected hip is short, then the head center should be positioned above the anticipated center of rotation by a distance that is equal to the measured limb-length discrepancy ("A" – "B").

Lastly, the neck length is marked and measured relative to its distance above the lesser trochanter. The optimal neck length can then be determined intraoperatively by testing various head lengths.

If the center of the trial femoral head is positioned medial to the planned center of rotation, femoral offset will necessarily be increased and the joint reactive forces acting at the hip will be correspondingly reduced. Conversely, if the femoral head center lies lateral to the center of rotation, offset will be reduced, resulting in lower abductor strength and increased joint reaction force. Clearly, this latter scenario should be avoided whenever possible[3,29].

Intraoperative Measurements

Limb Length and Femoral Offset

A jig that measures both of these parameters depends on a fixed reference point. The proximal reference consists of a Steinmann pin placed into the tubercle of the iliac crest through a percutaneous stab wound. A second point is then marked on the lateral aspect of the greater trochanter. With the hip in full extension, limb length and offset can then be precisely measured (Fig. 10) and may be adjusted as required[8].

As discussed previously, there are four means with which femoral offset can be effectively restored intraoperatively. Of these four, only the medialized high-offset femoral component design was found to not appreciably alter limb length

Special Tests intr-op:

Shuck Test

The shuck test facilitates an assessment of stability by distracting the hip joint through the application of in-line traction in a distal direction. This maneuver allows a subjective determination of the overall soft-tissue tension around the hip joint. By testing various combinations of neck offsets (high or standard), neck lengths, and possibly liners (standard or lateralized), the surgeon can assess which trial components provide optimal tensioning of the soft-tissue structures[7].

Dropkick Test

The dropkick test is a maneuver whereby the hip is held in extension while the knee is concomitantly flexed to 90°. If the extremity has been overlengthened, the extensor mechanism becomes excessively

taut and this may manifest itself as a tendency for the knee to passively swing into extension when the leg is released.

Leg-to-Leg Comparison

During patient positioning, it is essential that the patient's contralateral heel and knee are palpable through the drapes so that a side-to-side comparison of the treated and untreated limbs can be performed both prior and subsequent to insertion of the trial components. This technique serves as yet another means of assessing and comparing limb lengths in the operating room.

Additional Tests

Additional tests include an assessment of stability both in extension with concomitant maximal external rotation and in 90° of flexion of the hip and knee with concomitant maximal internal rotation

V. MCQ

1.Arthritis

Osteolysis is rare in patients in whom the polyethylene cup is wearing at a rate of less than about 0.1 mm/yr

The mean particle size is smaller with highly cross-linked polyethylene and that, in equivalent volumes, smaller particles tend to be more likely to cause osteolysis

Estimates of the forces through the patella range from 1.5 times body weight at 30_ of flexion to six times body weight at 90_ of flexion

PF joint contact pressure: There is a steady increase in contact surface area from initial contact in early flexion to about 60

Isolated patellofemoral arthritis occurs in up to 10% of patients who have osteoarthritis of the knee.

2.About hallux valgus

1. Final positioning should consist of 10° to 20° of hallux valgus, but care must be taken to allow clearance of the second toe by 1 to 2 mm. Dorsiflexion should be 15° to 30° from the first metatarsal, or 5° to 10° from the floor.

2. Malpositioning is the most common complication associated with this surgery

3. ° Ludloff osteotomy provided angular corrections similar to those provided by the basilar wedge and crescentic osteotomies, but with less elevation and shortening.

4. Scarp osteotomy: The osteotomy provides tremendous inherent stability to displacement as a result of the long dorsal shelf afforded with the horizontal saw cut.

5. IMA >16◦ and HVA >40◦ is severe hallux valgus

3-Cl dislocation

1. Previous studies have shown that Weaver Dunn reconstructions have failed at an average of 70 N compared with 641 N for the native CC ligaments

2. Tendon graft reconstructions failed at an average of 618 N, which was not statistically different than the native CC ligaments

3. Biomechanical studies have shown friction of the iliotibial band over the lateral femoral epicondyle is at its maximum between 25 and 30 of knee flexion

4.The Ober test2 also demonstrated pain over the lateral epicondyle in these patients.

5.The injection of cortisone in the area of friction o'er the lateral femoral epicondyle6 also has proven effective.

6. Appropriate candidates for surgical release and lengthening of the iliotibial band.

.

4.Elbow stiffness

1. Primary Elbow arthritis is more common in middle aged men

2.Humerocapitullar joint space is well preserved

3.The goal of treatment should be to achieve a functional range of motion (30° 130°).

4.With mild to moderate OA: Outerbridge-Kashiwagi arthroplasties

Severe degenerative changes: Distraction arthroplasty, TEA or arthrodesis

5. HO: 25% of humerus fractures”2 and 15% of simple elbow dislocations commonly result in elbow stiffness and extension deficits. More common with fracture dislocation

6.Dorsal bunion

1.Dorsal bunion is a recognized long-term complication after clubfoot surgery.

2.The causes of the deformity: weakness of Achilles tendon, overpowering of FHL, and imbalance between strong anterior tibial tendon with weakness of peroneus longus.

3.The patient often has weakness of the triceps surae due to overcorrection from clubfoot releases.

4 A reverse Jones procedure that consists of transferring the FHL to the I metatarsal head with metatarsal plantar flexion osteotomy when indicated.

5 The procedure provides a lasting and effective correction of the dorsal bunion deformity.

7.Frozen shoulder

1. MUA frozen shoulder: Usually abduction and flexion are restored before the external and internal rotation

2. Codman first used the term ‘frozen shoulder’. He stated that most cases resolved in about two years without treatment

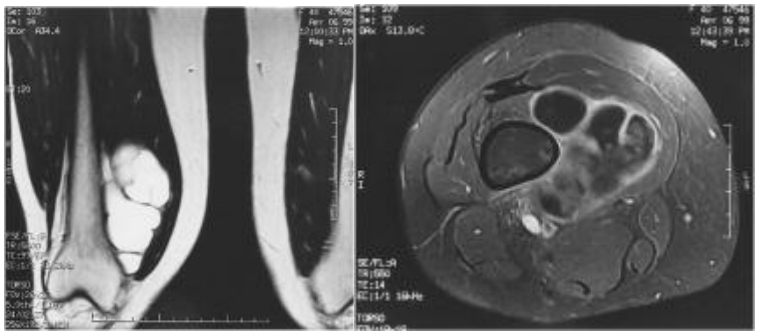
3. Although it is generally considered selflimiting, there are studies demonstrating a considerable number of untreated patients, with long-term disability and pain.6 Accordingly,there remains a group of patients who require definitive treatment

4. Those undergoing hydrodilatation did better [94%] than those who were manipulated [81%]

VI.Case Report:

Case Report: A 40-Year-Old Woman With a Painless Enlarging Thigh Mass

A 40-year-old woman presented with a large painless mass in the distal medial right thigh. The mass had been present for 4 or 5 months and was enlarging slowly, according to the patient. The patient denied any trauma. The lesion was firm to palpation over the region of the vastus medialis. Radiographs were obtained and no bony abnormalities were visualised. A magnetic resonance imaging (MRI) scan was obtained The mass was firm to palpation and seemed fixed to the femur. The tissues overlying were freely movable. There was no pain to palpation. No bruit was observed.



Based on the history, physical examination, and imaging studies, what is the differential diagnosis?

The radiographs showed a soft tissue density with no calcifications. There were no underlying bone changes. Magnetic resonance imaging scans showed a 6 cm × 8 cm homogenous multilobulated mass juxtaposed to the femur. There were no bony changes. The mass had peripheral enhancement when gadolinium was added. There did not seem to be invasion into the surrounding tissues.

D/D

Periosteal chondroma

Organizing hematoma

Myxoid liposarcoma

Myxoid malignant fibrous histiocytoma

Extraskeletal myxoid chondrosarcoma

HISTOLOGY

Histologic examination revealed a characteristic display of inconspicuous cells within a predominantly mucoid matrix). The relatively uniform spaces are composed of scattered spindle or stellate cells within a loose network of reticulin fibers. The hypocellular nature of intramuscular myxoma is characteristic. The diagnosis was myxoma.

TREATMENT AND DISCUSSION

The incisional biopsy was typical for a myxoma. Because the oncologist and musculoskeletal pathologist were comfortable with the benign diagnosis of myxoma, a marginal resection was done at the same time as the open biopsy. The final pathologic profile also was consistent with a benign myxoma. The mass was deep to the vastus medialis but loosely attached to the cortex. Therefore, this is most likely considered a juxtacortical myxoma.

The term myxoma first was introduced into English language literature by Stout in 1948 as a cellular growth containing excessive amounts of mucoid material. 13 Examining 95 cases of this benign mesenchymal neoplasm, Stout reported three cases that were intramuscular. In 1965, Enzinger 2 was the first to acknowledge 34 cases of myxoma as "intramuscular myxoma," and indicated the benign clinicopathologic course of the tumor. In 1967, Mazabraud and associates 8 thoroughly discussed the syndrome involving multiple intramuscular myxomas and fibrous dysplasia of bone. Numerous examples of this myxomatous tissue growth have been reported in the past 30 years, most of which uphold the characteristic clinical and pathologic profiles that have become so familiar. Despite its benign behavior, intramuscular myxomas sometimes are confused with various benign and malignant soft tissue tumors, and a definitive diagnosis is needed.

Throughout the years, the clinical characteristics of intramuscular myxoma have remained consistent. It is a benign soft tissue tumor typically occurring in adults between the fourth and seventh decades. Usually presenting as a solitary mass, multicentric forms of intramuscular myxoma are occasional. Showing predominance for women, intramuscular myxomas typically present a painless, palpable mass surrounded by muscle in deep soft tissues of the thigh, shoulder, buttocks, and upper arm. Nielson and coworkers 10 presented 28 of 51 cases of solitary tumors in the thigh. Kindblom and associates 7 also reported 10 of 18 tumors occurring within the thigh. Pain or tenderness is present only in patients in whom the size of the tumor creates pressure on the surrounding anatomy.

The radiographic observations of intramuscular myxomas are consistent. Plain radiographs occasionally show a mass of similar density to muscle, and angiographic tests reveal the displacement of normal vasculature. Computed tomography scans previously were used, but recently, MRI has evolved as the most helpful radiographic tool. 1,12 T1-weighted MR images reveal a hypointensive signal (darker) (Fig 4), and T2-weighted images show a hyperintensive image (brighter) (Figs 2, 3). Gadolinium enhances only the periphery of myxomas (Figs 4, 5). The homogeneous, sharply, margined edges that MRI reveals helps to differentiate intramuscular myxoma from malignant soft tissue tumors. Although the staging studies are characteristic, the rarity of myxomas makes the diagnosis less obvious.

Intramuscular myxomas maintain a characteristic pathologic profile, which is most helpful in the diagnosis. The gross appearance reveals an ovoid or globular glistening gray-white mass (Fig 8, 9). Myxomas are comprised of a stringy gelatinous myxoid material indenting the surrounding muscle. The size varies relatively little because most measure 2 to 10 cm. Hashimoto and associates4 reported an average size of 5.8 cm, with one mass enlarging to 20 × 17 cm.

Histologic examination revealed a characteristic display of inconspicuous cells within a predominantly mucoid matrix (Figs 6, 7). The relatively uniform spaces are composed of scattered spindle or stellate cells within a loose network of reticulin fibers. The hypocellular nature of intramuscular myxoma is characteristic; however, one report revealed hypercellularity, often being confused with more aggressive malignant soft tissue tumors with myxoid regions. 10 Rare pleomorphism, multinucleated

giant cells, or mitotic figures have been reported, 9 and occasional fluid-filled cysts appear. The constituent cells typically contain scanty cytoplasm with hyperchromatic and often pyknotic nuclei.

On electron microscopic examination, prominent Golgi complexes and pinocytic vesicles are present. Intramuscular myxomas also contain fibroblastlike cells, which normally are capable of forming collagen. Some authors have expressed that these fibroblastlike cells produce excessive amounts of glycosaminoglycans and acid mucopolysaccharides (shown by high percentage of hyaluronic acid), which in turn inhibit the correct production of collagen. 3,4

Immunohistochemical analysis aids in proper diagnosis and clarification from other benign and malignant soft tissue myxoid tumors. The cells in a myxoma stain highly positive for vimentin, a polypeptide combining with other subunits to form the filamentous cytoskeleton of mesenchymal cells. These tumor cells, however, stain negative for desmin, a protein tending to combine with vimentin to form connective tissue cell constituents. Along with a negative stain for protein S-100 markers, these immunohistochemical tests help to distinguish myxomas from other soft tissue sarcomas.

Numerous benign and malignant soft tissue myxoid neoplasms have been confused with intramuscular myxomas. Various benign myxoid masses are confused with intramuscular myxomas: myxolipoma, myxoid neurofibroma, and nodular fasciitis. Some fluidlike myxoid neoplasms, such as ganglion cysts, have overlapping imaging characteristics, which can cause confusion. More importantly, malignant myxoid tumors are confused with intramuscular myxoma, and an erroneous diagnosis may lead to overtreatment and undertreatment.

When compared with myxomas, myxoid sarcomas generally have increased cellularity and a more pronounced vascular pattern, and specific cellular elements. Immunohistochemically, myxoid chondrosarcomas stain positive for protein S-100. Low-grade myxofibrosarcomas are grossly more heterogeneous and more vascular. Myxoid liposarcomas present a similar painless, deep, myxoid lesion; however, dominant lipoblasts can be seen on histologic examination. Despite some distinguishing characteristics, however, these malignant neoplasms often are confused with intramuscular myxoma.

Treatment for intramuscular myxoma has remained relatively constant through the years. Regarding the benign nature and rare recurrence rate of intramuscular myxoma, simple marginal excision has been effective treatment. 3–6,8–15 Kindblom and associates 7 treated some patients with tumors with complete resection of the muscle, and Miettinen et al 9 indicated two cases of wide resection because of suspected malignancy. All 39 patients with intramuscular myxomas in the series of Ireland et al 6 were treated by simple local excision with no recurrence in a followup of 1 to 24 years.

The association between multiple intramuscular myxoma and fibrous dysplasia of the bone is extremely rare. 11,13,15 Characteristically, multiple intramuscular myxomas appear decades later within the same anatomic area of the body as the skeletal lesions. Several authors propose a common

mesenchymal origin between fibrous dysplasia and intramuscular myxoma. 14,15 Termed Mazabraud's syndrome, 8 this association was first reported by Henschen 5 in 1926. Other case reports have reaffirmed the rare affiliation of multiple intramuscular myxomas with fibrous dysplasia through the years. As of 1998, only 27 cases had ever been reported in the literature. 14 Marginal excision and a long-term followup are recommended even though local recurrences have been reported