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Arthroscopy Assisted Ankle Arthrodesis– Prospective study of 16 cases

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ABSTRACT

Introduction: Ankle arthritis is a very painful condition and arthrodesis is an end stage palliative procedure as total ankle replacement is still, not that effective and popular. The purpose of this study was to perform a clinical and radiographic review of the long term efficacy of the procedure.

Methods: Sixteen patients with isolated ankle arthritis were treated with Arthroscopy assisted ankle arthrodesis. There were 14 male and 2 female patients with age group ranging from 26 to 49 years. Right ankle was involved in 10 and left in 6 patients. They were followed up for 16-30 months with clinical examination, x-rays and American orthopedic foot and ankle score.

Results: In 14 patients average time to union was 14 weeks. Two ankles (12.5%) of the 16 ankles failed to unite and underwent revision surgery with implant removal, debridement, and bone grafting and anterior plate fixation. Both ankles unite in 12 weeks. Thirteen (82%) of the 16 patients who returned for follow up had no signs or symptoms of pain and instability. The average postoperative score for ankle-hind foot on the AOFAS evaluation was 78 points, and rate of the patient satisfaction was 14 (88%) of the 16 patients. There was no correlation between outcomes and patients ages.

Conclusions: Arthrodesis of the ankle can result in a painless, normal walking gait. When good surgical technique is used in carefully selected patients, ankle arthrodesis can be a reliable procedure for the relief of functionally disabling ankle arthritis, deformity, and pain

KEYWORDS

Introduction:-

Ankle joint is a major weight bearing joint subjected to daily stresses and strains. It is commonly injured in road traffic accidents, sports, and in some diseases like rheumatoid arthritis, gout, avascular necrosis, seronegative arthritis, infection, and Charcot joint [1, 2, 3]. Arthrodesis is an end stage procedure for painful, arthritic ankle joint. There many techniques for ankle arthrodesis such as compression screws, intramedullary nail or external fixation [6, 7]. As there is increase in the incidence of diabetes, rheumatoid arthritis, and failed total ankle replacements, difficulties arises due to poor bone quality, poor perfusion, and gross deformity of the joint and compromised wound healing [4, 5].

Our study aims to evaluate the efficiency of arthroscopy assisted, compression screw arthrodesis in 16 ankle arthritis patients.

Most common complications encountered are nonunions, tibial stress fractures, malunion, hindfoot arthritis, neurovascular injury, compromised wound healing, and infection [4, 5].

The operative techniques for ankle arthrodesis are technically demanding and involve lengthy operative time particularly in gross deformity and Charcot joint due to diabetes.

Techniques can vary depending upon type of arthritis, bone quality, and deformity.

There are many options for ankle arthrodesis, depending on the patient, diagnosis, and surgeon experience. Techniques of internal and external fixation have been reported with varying degrees of success [6, 7].

Material and methods:-

Sixteen patients underwent a unilateral ankle arthrodesis by a single surgeon between 2008 and 2014.

There were 14 male and 2 female patients with age group ranging from 26 to 49 years.

Right ankle was involved in 10 and left in 6 patients. Eight patients were diagnosed preoperatively as having traumatic fractures (one leading to osteoarthritis), four had avascular necrosis leading to ankle collapse, and two patients had previous ankle Tuberculosis, one with aseptic loosening, and two with rheumatoid arthritis.

The patients were given an ankle-hindfoot questionnaire developed by the American Orthopaedic Foot and Ankle Society (AOFAS) as a standardised method of assessing the clinical status of the ankle-hindfoot. The scale incorporates both subjective factors from the patient questionnaire, (e.g., pain and activity limitations), and objective factors from the surgeon questionnaire, (e.g., gait abnormality and alignment). This questionnaire was repeated at the eight week stage and at the patient's most recent stage in recovery to evaluate hindfoot function [10].

Surgery: - Surgery was carried out under general anaesthesia with the additional use of a knee block, administered by the anaesthetist under ultrasound guidance prior to induction. Prophylactic antibiotic therapy was commenced during the procedure and continued for three doses in all patients. The portals are identified, and the joint is infused with normal saline.

An 18-gauge needle is used to establish the joint line and arthrotomy portals. Three standard portals are used:

anteromedial, anterolateral, and posterolateral [7] .

The anterolateral portal is used first to visualize the joint. It is made with a number 11 blade just lateral to the peroneus tertius at the joint line. An arterial clamp is used to penetrate the deep layers, and a blunt obturator is used

to gain access to the joint. An outflow portal is placed in the posterolateral portal. A standard 21-point arthroscopic survey should be performed to determine the articular surface and viability of arthroscopic fusion [8].

Alternating between the two anterior portals, the articular cartilage of the tibial plafond, the talar dome, and the medial and lateral talomalleolar surfaces are removed. Care should be taken when removing cartilage so that no deep troughs are made. This can be visualized periodically under intraoperative fluoroscopy [7, 9]. A motorized shaver is alternated with both ring and cup curets. A grasper or shaver is used to remove floating articular cartilage.

Debridement is continued until viable, bleeding subchondral bone is seen. Excessive resection or squaring off of joint surfaces should be avoided to prevent a varus or valgus fusion [7, 8]. The anterior portals are usually sufficient to visualize and abrade the posterior compartment and transmalleolar spaces.The posterior portal can be used if these areas are inaccessible. The lateral part of the joint is usually debrided with the arthroscope in the medial portal and the debrider in the lateral portal. The converse is applicable for the medial half of the joint. An anterior lip osteophyte should be removed from the front of the joint to facilitate congruent tibiotalar fusion surfaces [9]. If the anterior capsule is adherent to the osteophyte, great care must be exercised in creating a plane between the osteophyte and the capsule. The neurovascular bundle lies just anterior to the capsule. Occasionally, it may be necessary to make a small incision directly over the osteophyte to facilitate its removal. The posterolateral portal is best to visualize the anterior capsule when this is being carried out [7, 8]. The articular cartilage is removed from talar dome, plafond, medial and lateral gutters using 5mm osteotome and shaver burr to create flat, bare and bleeding surfaces for good compression [8, 9].

Following arthroscopic debridement, the anterolateral portal is extended proximally for 2 cm to allow direct visualization and to further facilitate osteophyte removal. It is important that this arthrotomy portal be limited to 2 cm; any greater extension can compromise the superficial peroneal nerve [8]. Guide pins for the 6.5mm cannulated screw set are placed from the lateral and medial malleoli until the tips of the pins can be seen arthroscopically just penetrating the bone. The angle of entry of both pins is 45 degrees inferior and 45 degrees anterior from a posterior starting position on the malleoli [9]. The final fusion position is established, and the final position of the pins in the talus is estimated from their intra-articular position.The standard ankle fusion position is neutral flexion, 5 degrees valgus, and 5 degrees external rotation. The distractor is released, and the arthroscopic instruments are removed from the joint. The fluoroscope is used to aid in the final positioning of the fusion construct. The medial pin is advanced under fluoroscopy to ensure that it does not penetrate the subtalar joint. The pin is measured, and a self-taping partially threaded cancellous screw is advanced. Minor medial translation is afforded by placing the medial screw initially. The lateral pin is advanced, screw length is measured, and the second screw is advanced across the fusion site [8, 9]. The final position is checked in both the anteroposterior and lateral planes under image intensification. If an additional screw is necessary because of suboptimal bone quality and screw purchase, a third screw can be placed from the medial side and angled 25 degrees anteriorly [8, 9]. Preoperative assessment should have established whether a neutral flexion position of the ankle could be achieved or whether the gastrocnemius or gastrocnemius-soleus complex would prevent reduction. In the latter case, either an open gastrocnemius slide or a percutaneous Achilles tendon lengthening can be performed. Meticulous wound closure is essential, because the ankle does not have the wound-sealing ability of other joints that are routinely arthroscoped [8, 9]. 4.0 nylon suture should be used to close the arthrotomy portals; Steri-strips should not be used.

Postoperative schedule: - A posterior splint is worn for the first week, and the patient is encouraged not to bear weight. In patients with rheumatoid disease, the period of protected weight bearing may continue for an additional 3 weeks [5]. In cases in which excellent fixation was achieved and the patient is compliant, a removable cast boot with the hinges locked in neutral can be used as early as 2 weeks after surgery. In all cases, protection is continued until union is confirmed both radiographically and clinically.

Results:-

In 14 patients average time to union was 14 weeks. Two ankles (12.5%) of the 16 ankles failed to unite and underwent revision surgery with implant removal, debridement, and bone grafting and anterior plate fixation. Both ankles unite in 12 weeks. Thirteen (82%) of the 16 patients who returned for follow up had no signs or symptoms of pain and instability. The average postoperative score for ankle-hind foot on the AOFAS evaluation was 78 points, and rate of the patient satisfaction was 14 (88%) of the 16 patients. There was no correlation between outcomes and patients ages [10].

Vast improvement was found upon comparison of pre-operative and post-operative ankle-hindfoot scale assessments. The mean ankle-hindfoot AOFAS score increased significantly ($P < 0.05$) from 28.89 preoperatively (range 3 to 59) to 82.04 at the last review appointment (range 30 to 96) [10]. Time frames for the final review appointment varied greatly and depended on individual patient demands (mean 1.36 years, range 14 wk to 4.35 Complications encountered included infection, delayed union, and extended post-operative pain.

CONCLUSION

Arthrodesis of ankle can result in painless, stable and functional foot. When good surgical technique is used in carefully selected patients, ankle arthrodesis can be a reliable procedure for the relief of functionally disabling ankle arthritis, deformity, and pain [6, 7].

Arthroscopy assisted compression screw technique is a minimally invasive and provide enhanced compression and rigidity [7, 9].

Though the anterior plate is strong construct, it is associated lot morbidity in the form of wound dehiscence, blackening, infection, and hardware prominence.

Compression screw technique gives better results and is a patient friendly procedure causing lesser morbidity, hospital stay and early recovery [7, 8, 9].

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