

Arthrodiatais – Articulated Distraction of the Joints

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Abstract

Arthrodiatasis has a broad clinical application in the conditions where the joint motion and stability of the joint is needed. We have studied 30 cases involving the various joints in which we have distracted the joint gradually to achieve mobility and stability.

Keywords: Arthrodiatasis – Articulated distraction of the joints- Intraarticular fractures.

Introduction

The term Arthrodiatasis[1] was initially employed to describe a technique involving Articulated Distraction of hip joint, developed by surgeons in Venora since 1979. Arthrodiatasis means[2] stretching out of the joint, derived from the Greek word “Arthro” (Joint). “Dia” (through) and “Tasis” (to stretch out).The technique was coined as a conservative method of restoring joint function based upon the fact that under certain condition regeneration and repair[3] of damaged articular cartilage can occur at least to some extent.

Materials and methods

The technique of Arthrodiatasis was introduced in our institute since 1991. Since then 100 cases were treated by using the Ilizarov ring fixators,, unilateral external fixators for arthrodiatasis. We have selected the cases of joint pathology on basis of Intraarticular fractures, post traumatic stiffness ,Inflammation,contarctures treated Arthrodiatasis which mainly includes 10 knee joints, 3 ankle joints, 6 hip joints , 3 wrist joints and 8 elbow joints. For Arthrodiatasis, we have applied standard Ilizarov Fixator and Orthofix. In our study we have selected patients of Intraarticular fractures, Post traumatic Stiff joints, Inflammatory conditions of joints, Contracted joints including burns, AVN, etc. The patients were followed since discharge to two years. Preoperative ROM and TAM assessed before treatment, at the time of fixator removal and at the last followup. The outcome of the patient was assessed by the change in ambulation status and flexion contracture at followup and residual morbidity.

A) Hip Joint:

We have selected[4] 5 male and 1 female patients treated with arthrodiatasis . The diagnosis varies, with AVN- 2 patients,TB Hip - 1 patient, fracture central dislocation of hip in 3 patients.

B) Knee Joint:

We have treated 10 patients with flexion contractures by slow distraction using an Ilizarov external fixator (9 cases) and[5] Oganeyan ext. Fix. (1 case). We have three cases of bilateral knee contractures, one is post Rheumatoid, second is post juvenile Rheumatoid arthritis and third is post polio residual paralysis.

Retrospective review of records was performed to[7] determine specific knee contracture and TAM before treatment, at the time of fixator removal and at last followup. End results were graded according to the final flexion contracture, excellent (0 -5 degree) ; good (6- 15 degrees) fair (16 - 29 degrees), poor (> 30 degrees).

C) Elbow Joint:

We have treated 8 patients with stiff elbows by hinged distraction using Ilizarov type Two cases of old unreduced elbow dislocations. In both cases we have done Bhattachayra’s arthrolysis and radial head excision. Out of 8 cases,four cases were post traumatic stiffness, two were treated with Ilizarov& two by Oganeyan external fixators, With Ilizarov we have fair results. In total 6 cases we needed arthrolysis and radial head excision in two cases.

D) Ligamentotaxis:

We have 3 cases of intraarticular fractures of distal end radius in our study. All cases treated with ligamentotaxis by unilateral external fixators and percutaneous pinning, with the help of limited open approach technique.E) Ankle Joint:- We have treated 3 patients of Pilon fractures by arthrodiatasis with Ilizarov fixator, two of which are compoundfractures. We have nonunion initially in two cases

Results:

The results of 30 cases of Arthrodiatasis are graded

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according to the joint involved.

A) Knee Joint :

We have treated 10 patients with flexion contractures by slow distraction using Ilizarov fixator [9 cases] and Oganesyan ext [1 case]. In our series the cause of the contractures was post-traumatic stiffness, post burn contracture, post rheumatoid, juv. RA, PPRP. Total fixator time averaged 2 months (range 2 to 11 months). The follow up averaged 1 1/2 years. Based on the final flexion contractures, out of 10 cases, three were Good results (final FC < 5 degree), four fair results (final FC, 6 - 15 degrees), three poor result. Two knees underwent hamstring tenotomy having good results one. Two cases with bilateral flexion contracture, we have treated. With Ilizarov we have Fair results and with other knee we found rebound phenomenon. (table no. 3). One patient, with Rt knee flexion contracture secondary to Hereditary sensory motor disease, have got subluxation of knee joint during distraction phase. Subluxation was successfully treated with Ilizarov but flexion contracture recurred by 10 degrees. Among the three post traumatic cases. Specific range of motion was studied at three times, preoperatively, at fixator removal and at final followup. Stastistical data shows that the TAM remained constant after treatment but changed to a more useful arc. Also there was partial recurrence of deformity after fixator removal. Two patients showed diminished TAM after fixator removal. This stiffness may be due to prolonged knee immobilisation in the fixator.

B) Hip joint : We have treated 6 cases for Arthrodiastasis of hip by Ilizarov method including two AVN, one T.B. Hip and three cases of post traumatic fracture. In all cases we have done only articulated distraction of hip. No any soft tissue release needed in our series.

A Good clinical results were defined as

- 1) A resumption of normal activities with no pain or mild pain only after a prolonged exercise
- 2) Greater than 150 degrees of TAM with 90 degrees flexion and 20 degrees in abduction, adduction and IR & ER and
- 3) Independent ambulation for at least 30 minutes.

The Results were assessed by questionnaires to these patients, on clinical examination and also on radiological improvement. But Radiologic improvement did not always parallel clinical improvement. We have good results in two patients, having AVN Hip (Ficat & Arlet Classification - stage I & II) one post alcoholic and one Idiopathic by Ilizarov. Postoperatively more than 90 degrees flexion and more than 20 degrees abduction, adduction, IR & ER and also improvement in ambulatory status. In one of the above case (Bil. AVN) we have done core decompression on one hip and arthrodiastasis on other side. Clinically now patient had no pain at all and can walk daily almost 1 1/2

kilometers and can sit, squatt without any pain. (table no. 2). Also we have treated three post traumatic cases with fair results. In one case we had a infection at shanz pin site. In one case, we had a 14 years male boy having T.B Hip with pain in hip, true shortening of 2 cm, FFD 40 degrees and difficulty in walking. Arthrodiastasis of Lf Hip was done and antikoch's started. After 1 1/2 years (last followup) patient had only 10 degree FFD, No pain and can able to sit, squatt and walk without any pain.

C) Elbow joint :

We have treated 8 cases with arthrodiastasis by Ilizarov method (6 cases) and by oganesyan method (2 cases). In 2 cases of unreduced elbow dislocation, we have done Bhattacharya's arthrolysis. In one case we have good results with final result of almost 130 degrees flexion and only 5 degrees terminal restriction of extension. In another case, we have tried alone distraction without arthrolysis but failed to reduce the dislocation so in second stage we have done arthrolysis and then Ilizarov method with fair results. 4 cases of post traumatic stiffness treated by Ilizarov (3 cases), one by Oganesyan ext. Fix. Cause of stiffness was N/U L/3 Humerus, Comp. Elbow with fracture S/C Humerus, shaft Humerus with intercondylar extension, respectively. In one case, stiffness since birth, we have done fractional lengthening of biceps muscle with good results. Out of 8 cases, in one case we found radial nerve palsy post operatively (recovered after 2 months). In two cases minimal pintract infection.

Complications:

The common complications are mainly Pin tract infection, restricted mobility of the joint, rebound phenomenon, pain, neurovascular injury and subluxation of the joint.

Discussion:

There are number of circumstances where the joint mobility and joint stability are the goals. Previsously we used to ensure the union of the fracture first and followed by the judicious timing of the joint motion to avoid stiffness. But there are some circumstances in which the final result would be improved if the both th egoals could be addressed simultaneously. Here comes the concept of a hinged joint distraction in which both joint motion and joint stability are simultaneous treatment goals. An example of such is the treatment intraarticular fractures of the release of stiff joints with body motion, but with protection to the osteosynthesis. The Decision making is based on the cause, its degree, its long standing nature, presence of tibiofemoral subluxation in knee, neurologic involvement, patients ability to participate in the treatment and the medical facilities available. Arthrodiastasis neutralises muscle and weight bearing forces and creates a potential space

where cartilage repair may occur. Also movement encourages a synovial circulation and allows nutrition and there is fibrous repair without adhesion formation. In cases of stiff elbows, role of soft tissue release is important. In cases of stiff elbows, the role of the soft tissue release is important. Arthrolysis is comparatively a more conservative and physiological surgical procedure. The joint is mobilized after removal of the contractures of capsule, myositis mass etc. According to Dr Bhattacharya's report, results are assessed over a period of 28 years and convincing enough to advocated this method as a primary procedure before application of external fixator. In cases of unstable intraarticular fractures of the distal radius, external fixation has become an effective tool in the management of difficult fractures. careful assessment of the pattern, patient selection, technique, choice of fixation and postoperative rehabilitation provides foundation for successful management of these fractures. The main advantages are Minimally invasive procedure, Indirect reduction with ring fixator, Versatile procedure. Articulated hinge distraction[8] has a broad clinical application in those conditions in which both joint motion and stability are needed. But the basic biology of gradual distraction of skin, muscle and connective tissue has not been thoroughly studied. Experimental evidence suggests that low-load

prolonged stretch is preferred to high-load brief intermittent stretch in elongation of collagen.

Conclusion:

All Intraarticular fractures can be treated well with concept of hinged distraction of the joints. In post traumatic stiff joints, inflammatory conditions, flexion contractures we have fair to good results. Our study report is based on results of 30 cases with average follow up of 1.6 yrs. There were no significant complications except pintract infections. We have reasonably good results in distal end radius intraarticular fractures and stiff elbow cases. Ankle arthrodiastasis should be considered a viable treatment for severe ankle arthritis. The future treatment for ankle arthritis will likely involve ankle distraction with cartilage repair. But further studied will be required to study the efficacy of these procedures. There are still many unanswered questions[9]. Also little is known about the cause of the Rebound phenomenon, although tissue memory may be a result of reformation of collagen cross links or myofibroblast-induced contracture. Where does the muscle stretch? Would Motorised continuous passive motion improve results? How can the rebound phenomenon be minimised? What is role of soft tissue release?.

References

1. Moorey Bernard F: Distraction Arthroplasty -clinical Applications : CORR No.293, Aug.1993, Page -46 -54.
2. Helmién. H. J. Jurvelin:- Joint loading:- Biology and health of articular structures Page 372- 391.
3. Aldegheri. R - Artrodiastasi. d'anca. ortopedia. e. Traumatologia. oggi. 1981; 1:103:9.
4. Aldheghere Roberto, Giampaolo Trivella, Michael Saleh :- Articulated Distraction of Hip. Conservative surgery for arthritis in young patients : C.O.R.R. No.301, April.94, Page.94 - 101.
5. Scott. W.N:- The knee :- Knee physiology & Biomechanics Page 75- 81.3
6. Herzenberg, John E; James R. Davis; Dror Paley; Anil Bhave :- Mechanical distraction for Treatment of severe knee flexion
7. Damsin J.P. Joint contractures. In Bianchi Maiocchi A & Aronson J. Operative Principles of Ilizarov. Baltimore Williams and Wilkins. 1981 PP-436 - 440.
8. Dr. Kulkarni G.S:- Recent advances in Orthopaedics Page 500- 510.
9. Volkov M.V. and oganesian O.V.:- Restoration of function in the knee and elbow with a hinge distraction apparatus JBJS. 57 A, 1975 page-591.

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