

## Arthrodesis of Knee Joint With Compression Screws

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### ABSTRACT

Twenty patients with tumors, trauma and paralytic conditions of the and knee joints were treated with the compression screws and arthrodesis was achieved at the knee joints . There were seven females and thirteen male patients. All the problems such as shortening, and angulation and deformity were addressed at the same time. We followed the radiological union and clinical observation to assess the achievement of union at the arthrodesis site. When all the 4 cortices were united on 2 orthognol views and patient were full weight bearing and mobile without support and pain, we accepted the success of the treatment. According to these criteria, we achieved excellent results in 18 (90%) cases of and failure in 1case (5%). One patient was lost from followup. Arthrodesis with compression screws is strongly recommended in achieving arthrodesis at the knee joint, especially in cases with severe posttraumatic arthritis in young age. It is less cumbersome and more tolerable in patients as compared to the external fixators. and costly intraarticular implants. This is an excellent method to deal with the young patients having severe post traumatic arthritis.

**Key Words:** Arthrodesis, Knee Joint, Compression Screws

### INTRODUCTION

Arthrodesis is an operation designed to produce bony ankylosis of a diseased joint<sup>1</sup>. It is often a satisfactory solution for infection, tumors, trauma, paralytic conditions, and for certain patients with osteoarthritis and rheumatoid arthritis'. Arthrodesis can be intraarticular, extraarticular or both. Extraarticular techniques were described for use in children and in patients who had large amounts of necrotic bone or active infection as in tuberculosis but with the advent of effective chemotherapy these techniques have lost favour. The bony surfaces in an arthrodesis must . be securely held together by internal or external fixation. After arthrodesis, most patients are satisfied with the relief of pain.

Intraarticular apposition of bony surfaces devoid of articular cartilage followed by compression has been shown to give the best results. Compression can be achieved by internal fixation using plates or screws or by external fixation. In noninfected cases compression screws are excellent and cost effective to achieve arthrodesis while in the presence of infection external fixation is the preferred method. Arthrodesis should be considered after conservative treatment fails. Infections, deformity, sensory deficiencies, and bony defects require special consideration. The use of bone graft and internal or external compression will enhance the likelihood of a successful arthrodesis'.

### PATIENTS AND METHODS

This is an ongoing prospective study carried out at Sir Ganga Ram Hospital Lahore from Jan 2008 to Feb 2012-. A total of 20 patients, 13 male and 7 female with a mean age 32.95 years (18- 45y) presented with post-traumatic osteoarthritis resulting from periarticular fractures, inflammatory arthritis, tumours and post polio deformities (see table No. I). No infected case was included in the study Knee arthrodesis was performed in 20 patients. All the patients were counselled about the advantages and disadvantages of the procedure particularly loss of knee movements but pain free full weight bearing. All the patients were operated under spinal anaesthesia. Tourniquet was applied before surgery. A longitudinal midline incision was made from lower third of thigh to upper third of leg, Medial parapatellar arthrotomy was performed. Articular surfaces of femur, tibia and under surface of patella were shaved and denuded from articular cartilage until the underlying bleeding raw surface appeared. Two crossed screws of 6.5mm with thread size of 32mm and washers were introduced across the joint, As the screws were tightened, compression was achieved One screw was introduced from anterior (patella) to posterior (femur) direction to give more stability. Hemostasis was secured and suction drain was placed inside the wound. Post operative plaster back slab was applied which was converted into full plaster cast after the removal of drain on 2<sup>nd</sup> post op day. Stitches were removed at 15th post op day.

**Table 1:** Distribution of Diseases

Diseases	Male	Female	Total	%age
Post traumatic Arthritis	8	5	13	65%
Tumor	2	0	2	10%
Post Polio Paralysis	2	1	3	15%
Inflammatory Arthritis	1	1	2	10%

Patients were kept non weight bearing for 3 months after which they were started gradual weight bearing leading to full weight bearing within next one month Out of 13(61%) patients suffering from severe posttraumatic osteoarthritis, 8(35%) were male and 5(38%) were females. All were young patients ranging between age group of 17 – 25 years ( avg-20y).In young age group arthrodesis is a better choice over arthroplasty as far as functional requirements are considered.

There were 2 (10%) patients with tumos around the knee joint who have intraarticular extension. In both cases adequate debridement with bone grafting was done.One patient was having Giant cell tumor of proximal tibia

The other patient had recurrence of Giant cell tumor of medial femoral condyle. Patient was initially offered amputation but he refused and the knee arthrodesis was part of an attempt at limb salvage. Out of 20 cases undergoing arthrodesis of the knee joint, 17 patients had primary compression arthrodesis with mean time in the plaster cast for 3months after which they were allowed to bear partial weight, All the patients were full weight bearing after 4 months of the primary fixation.The mean number of previous surgical procedures was  $0.66 \pm 1.03$  days (mean  $\pm$ lsd, median 0, range 0-2).

**ACHIEVEMENT OF UNION**

Of the 20 cases analysed of knee arthrodesis 18/20 (90%) achieved union. Out of the 2 cases, one patient having regurrence of tumor was lost from followup and another patient suffering from inflammatory arthritis, ended in implant failure and pseudarthrosis at the arthrodesed site.In the worst case scanerio and among the most difficult cases we achieve solid arthrodesis.If we consider these two case to be a failure. Our success rate in knee arthrodesis was 90 %

**LENGTH**

All of the patients had limb shortening less than 2.5cm. One patient having Giant cell tumor of the

proximal tibia was having 4cm shortening, She refused any limb lengthening and walked with 4cm heel raise. The other patient with tumor of distal femur was having 5cm shortening was lost from followup

**ALIGNMENT**

Our aim was to keep the knee in 5-7 degrees of valgus and fiexion and The Final position in patients undergoing knee arthrodesis is shown in the table 2.

*Table 2: Final position in patients undergoing*

No	<i>knee arthrodesis</i>		
	shortening cm	flexion Degrees	Valgus Degrees
1	3	0	0
2	1.5	5	5
3	1.5	5	5
4	2	5	5
5	1.5	5	5
6	2	5	7
7	1.5	5	5
8	1	7	7
9	1.7	5	7
10	1.5	0	5
11	2	5	5
12	1	5	5
13	5	6	0
14	4	7	7
16	2	7	5
17	2	4	5
18	2	5	0
19	1	5	7
20	2	5	5
Mean	1.91	4.55	4.5
Median	1.5	5	5
SD	0.55	1.76	2.14
Range	1.5 to 3	0 to 5	0 to 7

**COMPLICATIONS**

All (100%) patients complained for pain in the early postoperative period that was a common phenomena. Pain was relieved with oral analgesics.There was no case of postoperative infection and nonunion. There was only one case that lost to follow up and most probably poor patient selection as far as tumors are concerned.

No case required revision surgery. There was no case of neurovascular injury and algodystrophy.

**DISCUSSION**

Various methods of knee arthrodesis have been described such as the Charnely compression clamp, compression plating, intramedullary nailing<sup>15,16,17</sup> and monolateral external fixation<sup>3</sup> devices described in the previous sections . The comparison between different. studies. The present study and their complications is given below, We compared the results of different studies in which arthrodesis of the knee was achieved with compression screws with the results of other studies.

We achieved bone union in 18/20 cases (90%) ,if the case lost to follow up is counted as a failure).These results are as good as mentioned in other studies if not better than those reported in the literature, despite the complexity of our cases

We compared the results of different techniques of knee arthrodesis with the results of our present study.

**Table3:**

Study	leavo et al	Hessmann <sup>2</sup> et al	Stiehl et al <sup>3</sup>	Usui et al <sup>5</sup>	Pritchett J W et al <sup>7</sup>	Hak DJ et al <sup>8</sup>	Present Study
Mode of Fixation	Intramedullary nail	Mono lateral external fixation	a medial compression plate with intra medullary rod	vascularized fibular graft (VFG)	dynamic-compression plate and screws	External fixator	Compression Screws
%age of Results	95%	100%	100%	90%	100%	75%	90%

Usui et al<sup>5</sup> performed knee arthrodesis in 17 patients using vascularized fibular graft (VFG) and achieved solid fusion in 18/20(90%) cases". Pritchett J W<sup>7</sup> et al had performed an arthrodesis of the knee in twenty-six patients by using a single anterior, broad, contoured dynamic-compression plate and screws that were applied as a tension band. Bone grafts were not used. They achieved solid arthrodesis in all cases (100%)<sup>18</sup>.

Hak DJ<sup>8</sup> et al performed thirty-six knee arthrodeses using an external fixator with an average followup of 48 months. A single plane fixator was used in 19 cases and a biplane fixator in 17 cases. A fusion was obtained after the initial procedure in 22 patients (61%). With additional

leavo et al from Burlington<sup>1</sup>, USA performed knee arthrodesis using an intramedullary nail has gained acceptance as treatment in difficult cases such as infection after total knee arthroplasty (TKA) , neuropathic joint, and obesity and obtained 95% successful results".

Hessmann<sup>2</sup>et al from Germany published the results of their study using a mono lateral external fixation assembly for knee arthrodesis with infectious destruction of the joint following osteosynthesis (tibial plateau) in 12 cases, posttraumatic arthrosis of the knee joint with chronic infection in 4 cases, flexion ankylosis of the knee in 1 patient, and destructive steoarthritis of the knee complicated by an empyema in one case. They achieved solid fusion in all cases. Stiehl et al<sup>3</sup> presented a series of eight cases in which they used a medial compression plate with intra medullary rod for fixation. Union occurred in all cases, including two proximal tibial segmental allografts<sup>16</sup>.

procedures, a fusion was obtained eventually in 27 patients (75%)<sup>19</sup>.

In present' study we achieved solid arthrodesis in 18/20 cases and had (90%) successful results comparable to the above mentioned studies. These results are as good as if not better than those reported in the literature, despite the complexity of our cases.

When we compare this technique with other techniques of knee arthrodesis,espccially external fixators<sup>3,4,16</sup> and long implants like plates and long intramedullary nails<sup>6,7,8,14</sup> this technique is more tolerable for the patients , We can produce equally well results with less cost of the implant. With contrary to popular belief in Pakistan the majority of the patients in this series coped well One of the

main difficulties encountered during the course of this study was the fact that the majority of the patients (10 out of 20) did not reside in Lahore and the constant travelling to and from their villages for follow up created a significant financial burden.

The single patient who was lost to follow-up was probably due to poor patient selection. Patient selection and constant support, particularly mental, form an important part of this treatment.

The pros and cons of treatment should be discussed in detail with the patients particularly the duration of treatment and the minor complications he may expect. If possible, he should meet a patient undergoing similar treatment. All these efforts help to make the patient psychologically prepared.

The use of a multidisciplinary team consisting of a surgeon, a clinic nurse, a physiotherapist and a psychologist have been recommended in the literature. These facilities are not available even in most teaching hospitals in Pakistan consequently the entire burden falls on the surgeon. Despite these drawbacks the results achieved in this series indicate that with dedication, attention to detail and patience these material difficulties can be overcome.

## CONCLUSION

We have found this a safe and effective technique for knee arthrodesis suited to most patients in Pakistan. The technique is simple, easily performed with low implant cost and good results as that of other techniques, provided that the patients are selected and counselled properly, followed up diligently with constant psychological support so that complications can be detected early and dealt with efficiently. We have no hesitation in recommending this technique of arthrodesis of the knee particularly in post traumatic cases instead of using complicated techniques.

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