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Fixation Of Diaphyseal Fractures Of Femur Using Kuntschers Nail With Supplementary Fixation Is It Still Relevant?

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Abstract: *- Femoral nailing has advanced continuously over the past 60 years. The transition from open nailing techniques to closed techniques using a remote entry site at the proximal femur paralleled the availability of image intensifiers and specialised equipment and centres. The introduction and increased popularity of interlocking nails allowed for improved rotational control, better maintenance of femoral length, early weight bearing, the use of smaller implants, and improved control of comminuted and segmental fractures.Today interlock nailing has become the gold standard for diaphyseal fractures of femur all over the world but even in today's world there exist a large chunk of population who cannot avail of these methods. In a developing country like India the availability of such techniques and facilities is largely limited to urban centres only; while the majority of the population of the rural areas are unaware or unable to avail them. Many factors are responsible for this scenario like lack of facilities (equipments and trained manpower) in the local area, lack of proper maintenance of equipment if available, lack of proper transport facility to an equipped centre and economic constrains. This results in such a major fracture being treated by herbal treatment/ quacks/ osteopaths or not being treated at all causing great morbidity and mortality.*

In such a scenario the use of retrograde Kuntschers nailing with supplementary screw/plate fixation offers a viable alternative giving acceptable results at a fraction of the cost and being possible in any operation theatre using the basic orthopaedic instruments and techniques.We retrospectively reviewed the results of 110 cases of femoral diaphyseal fractures treated by retrograde Kuntschers nailing with supplementary screw/plate fixation from June 2004 to December 2010.

Keywords: ***Femur nailing; kuntchers nailing; diaphyseal fractures; long bone fracture.***

INTRODUCTION

Though the history of intramedullary nailing dates back to 1875 when Heine from Germany introduced ivory intramedullary pegs for diaphyseal pseudoarthrosis. It was not before Gerhard B. Kuntscher1, 2 of Germany, who in 1940 introduced the intramedullary nailing, that the procedure was accepted universally and it is being used even today all over the world. However, certain comminuted, segmental and non-isthmal fractures of the femur are difficult to treat with this standard method as it fails to prevent shortening, angulation and rotation at the site of fracture and the fixation invariably is unstable. Kuntscher3himself in1968 reported the use of transverse screws through the top and the bottom of the nail to prevent such problems and call this "the detensor nail". This concept was further taken by Klemm4 in 1970 that used the more descriptive term "interlock nail" which have proved reliable in controlling length and rotation and is the standard method of fixation of long bone fractures today. Closed femoral interlocking has emerged as the universal gold standard in the management of diaphyseal fractures of femur.

However the availability of specialized equipment and trained manpower is not possible everywhere particularly in developing countries such as India and in such situations intramedullary Kuntscher's nailing with supplementary fixation using plates or screws for additional rotational stability may provide aviable, effective and cheaper alternative.

MATERIAL AND METHOD

This study includes a retrospective review of 90 cases (June 2004-December 2009)and prospective study of 20 cases (Jan 2010-December 2010) of femoral shaft fractures treated by intramedullary Kuntscher nail with supplementary fixation by derotation screw or plates during the period from June 2004 to December 2010.

The standard procedure of retrograde intramedullary nailing in lateral position using posterolateral approach was performed wherein supplementary fixation by screws was done in 41 cases and by plate and screws in 69 cases depending on intraop assessment. Autologous iliac crest bone grafting was done in 83 patients to augment fracture healing. Perioperative antibiotic coverage was instituted for all patients with third generation cephalosporin and an aminoglycoside for a period of 3-12 days (average 4.5 days) depending on the wound condition and evidence of infection.

All patients werefollowed up for a minimum of 12 months (range 12 - 72 months). On each follow-up visit patients were assessed both clinically and radiologically. Standard AP and Lateral X-rays were taken and assessed for implant position and radiological union. Results were assessed by criteria given by Magerl et al5 which included a four level grading of pain, limp, ability to do strenuous activity, quadriceps power, shortening of limb, mobility of knee joint, evidence of infection, neurovascular disturbance and evidence of non-union (Table 01). A total number of 18 patient's recordscould not be tracedfor the first 12 months as per the study parameters and were excluded from the final data.

RESULT

The mean age of patient was 32 (18 -56 years) year with 93 (84.5%) males and 17 (15.5%) females. Majority of patient (65%) sustained fractures following high energy trauma (RTA) with fall from height (25%), fall at home and assault making up the rest. For descriptive purposes the femoral diaphysis was divided into three zones (Upper, Middle and Lower thirds) and fractures were assigned based on Xray findings. Findings reveal that middle third fractures were most common, constituting nearly 45% (50 cases) of all fractures.All fractures were further classified based on fracture geometry in to transverse, oblique, spiral or comminuted. Transverse fractures were encountered in 54 cases, comminuted fractures in 38 cases, oblique fractures in 12 cases and spiral in 6 cases.

Majority of fractures being high energy trauma were associated with other injuries as well which were classified as (1) ipsilateral lower limb injuries (2) contralateral lower limb injuries (3) pelvic injuries (4) upper limb injuries (5) chest/abdomen injuries and (6) head injuries. Most common associated injury were Ipsilateral lower limb injuries (28 cases) followed closely by head injuries (23 cases).

Patients were operated as soon as they were medically fit for the procedure (1-12 days), in 4 patients the surgical procedure was delayed more than 10 days due to associated head and/or chest/abdomen injuries.

In all patients standard procedure of retrograde intramedullary nailing was followed after adequate reaming of the femoral canal. In all patients supplementary fixation was done using either cortical screws alone or 4.5 mm plates for

rotation control as assessed intra-operatively. Only screws were used in 41 cases and in the rest 69 cases 4.5 mm plates were used. Autologus iliac crest bone grafting was done in 83 cases based on operating surgeonsjudgement.

All patients were given peri operative antibiotic cover of a third generation cephalosporin (1 gmceftriaxzone) and an aminoglycoside (500mg amikacin) for three days as standard. Antibiotic coverage was modified/extended based on wound condition. Superficial infection was found in 19 cases, all of which responded to post culture specific and extended antibiotic therapy 5- 12 days). No persistent deep infections were encountered in this study.

Post discharge all patients were followed up monthly for three months and then three monthly for one year. Beyond that once a year follow-up was advised to all patients. At each visit patients were assessed clinically and radiologically using the criteria described by Magerl et al.

Of all the complications encountered in the study infection was the most commonly found in 19 cases, all were superficial which responded to post culture specific and extended antibiotic therapy.

There were no cases of persistent deep infections. Other main complications were non union in 5 cases, shortening more than 10mm in 4 cases and loss of range at knee joint <75% in 7 cases.

Final results at one year were found to be excellent in 42 cases, Good in 38 cases, Fair in 17 cases and Poor in 19 cases. Of the 19 cases classified as poor, maximum cases (9) were those with less than 50 % joint mobility and quadriceps power less than grade three. These can be attributed to lack of compliance to advised physiotherapy.

TABLE- 01 CRITERIA FOR EVALUATION OF RESULTS

CRITERIA	10 POINTS	7 POINTS	4 POINTS	2 POINTS
Pain	No pain	Occasional	On moderate activity	On weight bearing
Limp	No limp	Mild	Moderate	Severe
Strenuous activity	Possible	Limited	Severely limited	Impossible
Quadriceps power	V	IV	-	III
Shortening (mm)	0-5	6-10	11-20	21 or above
Mobility of joints	Normal	80%	75%	>75%
Infection	Nil	-	Superficial	Deep
Neurovascular disturbance	None	Minimal	Moderate	Severe
Non-union	None	-	-	Yes

Total points: 90
76-90 : Excellent
61-75 : Good
46-60 : Fair
45 or below : Poor

DISCUSSION

Femoral shaft fractures are one of the most common injuries treated by orthopaedicians the world over. Closed locked intramedullary nailing is the current gold standard for the management of these injuries. However availability of interlocking trained surgeons and the instrumentation and the radiological equipment is still not within the reach of majority of population of our country. This either leads to the mis-management by quacks and osteopaths or patients needing to travel out of their local area for the treatment usually at great expense of time and money.

Kuntchers nailing with supplementary fixation uses standard orthopedic equipments and techniques and they do not require expensive radiological equipment or specialized training. This procedure can be done in most basic OT setup which exist across the country in government setups. This study with 80 out of 110 (72.7 %) showing excellent and good results demonstrates that IMK nailing with supplementary fixation gives comparable results to closed intramedullary interlock nailing besides having the advantage of being available at every basic OT and having reduced infrastructure costs. This is ultimately advantageous to the patients as they are offered a well-established procedure and a fraction of the cost, in their local area.

The disadvantages of a bigger scar and slightly increased period of rehabilitation and weight bearing are easily outweighed by the advantages of the procedure outlined above and hence offer a viable alternative where facilities for a closed interlock nailing do not exist.

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