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Archives of Applied Science Research, 2014, 6 (3):94-101
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Subtrochanteric femoral fractures treated by fixation with dynamic condylar screw

Sunil V. Patil and Sangram Rajale

Department of Orthopedics, Bharati Vidyapeeth Medical College & Hospital, Sangli, Maharashtra

Senior Resident, Bharati Vidyapeeth Medical College & Hospital, Sangli, Maharashtra

ABSTRACT

The purpose of this study was to evaluate the results of dynamic condylar screw in the management of subtrochanteric femoral fractures, regarding union time, implant failure rate; infection rate and functional outcome. This prospective study was carried at the Department of Orthopedics Bharati Vidyapeeth Medical College & Hospital, Sangli, Maharashtra. Study period included cases from Jan 2008 to Dec 2010. Total 52 consecutive patients with sub-trochanteric fracture were studied. Four patients were lost during follow-up and total 48 patients were finally assessed. The inclusion criteria included closed subtrochanteric fractures in adults of both gender aged 20 years or above; Pathological fractures and Open fractures were excluded from the study. After fixation of fractures with dynamic condylar screw patients were followed-up for 6-12 months, the mean follow up period was 8 months. Results of treatment were assessed by the Radford criteria. Among 48 followed up cases, males were 29 (60.42%) and female 19 (39.58%). Most common mode of injury was road traffic accidents in 32 patients (66.66%) and 10 patients had domestic fall & 6 had fall from height (High Velocity). All the patients underwent operative treatment by fixation of DCS after preliminary fitness protocol. Autogenous bone graft was done in 03 patients. The union rate in this series was (93.5%). Implant failure was observed in 03 (6.25%) patients, 03 (6.25%) patients developed varus deformity and infection occurred in 02 (4.66%). According to criteria of Radford, we achieved good to excellent results in 81% cases, fair in 6 (12.5%) patients, poor in 03 (6.25%) patients. We conclude that some Sub-trochanteric fractures need open reduction and internal fixation to avoid complications like implant failure, nonunion, infection, and mal-union. In our scenario we feel that DCS is a Sturdy, Stable & Strong Implant for peculiar sub-trochanteric fractures.

Key Words: Sub-trochanteric Femoral Fractures, Dynamic Condylar Screw, Internal Fixation.

INTRODUCTION

Sub-trochanteric fractures comprises of 10-34% of all hip fractures.[1] Although different implants are available to internally fix this fracture, due to the anatomical & biomechanical reasons, the sub-trochanteric femoral fracture is still a challenge for Orthopedic Surgeons. The forces in this area are up to 1,200 pounds/square inch on the medial cortex leading to immense stresses in the area. Besides this the orientation of muscle forces in this area causes shear at the fracture site[2].

Biomechanical studies have shown that femoral cortex in the postero-medial subtrochanteric region is subjected to highest stresses (Linear & Rotational Torque) in the body as a result of high compressive and tensile forces in the medial cortex distal and lateral to the lesser trochanter respectively, internal fixation is difficult and risks a high failure rate [3]. Considering the biomechanical forces which lead displacement, open reduction and internal fixation is necessary. Conservative treatment gives only satisfactory results in 56% of patients as compared to 70-80% for operative methods [4].

During the past 30 years, there has been a near-complete elimination of non-operative treatment in adults and a corresponding increase in the operative treatment of subtrochanteric fractures [5].

There are two main types of devices to fix subtrochanteric fractures, intra-medullary devices and extra-medullary devices. Intramedullary implants include reconstruction nail, gamma nail, Russell Taylor nails, PFN while extramedullary implants commonly used include A.O 95 angled condylar blade plate, A.O 95 degree dynamic condylar screws, Dynamic hip screws. The A.O dynamic condylar screw provides strong fixation in the cancellous bone of the neck and head with considerable rotational stability [6].

Intra-medullary devices require less surgical exposure, enable early weight bearing, achieve better proximal fixation and exert less biomechanical stresses. However they are not suitable for subtrochanteric fractures with intertrochanteric extension and are associated with technical difficulties in 63% of cases [7] especially when there is a lateral cortex burst. DHS and DCS are among the best fixation devices in the armamentarium for subtrochanteric fracture management [8]. DCS are preferred to fix subtrochanteric fractures, probably it has an advantage of easy insertion, firm fixation, increase strength, and resistance to stress failure, less operative time and short hospital stay [9].

Complications of subtrochanteric fracture management are, non-union, implant failure, malunion, and wound infections. We have used dynamic condylar screw fixation to stabilize subtrochanteric fractures in our set-up. This study was conducted to evaluate the results of fixation of this device in our scenario.

MATERIALS AND METHODS

During January 2008 to December 2009 (2 year period) 52 subtrochanteric femoral fractures were included in this study, conducted at the Department of Orthopedics, Bharati Vidyapeeth Medical College & Hospital, Sangli, Maharashtra. Four patients were lost for follow-up. Finally 48 patients were assessed to evaluate union rate, implant failure, infection and functional outcome. This was a prospective type of study. The inclusion criteria was closed subtrochanteric fractures in adults of both gender. The age ranged between 20-80 years with average age 44.5 years. Pathological fractures and open fractures were excluded from the study.



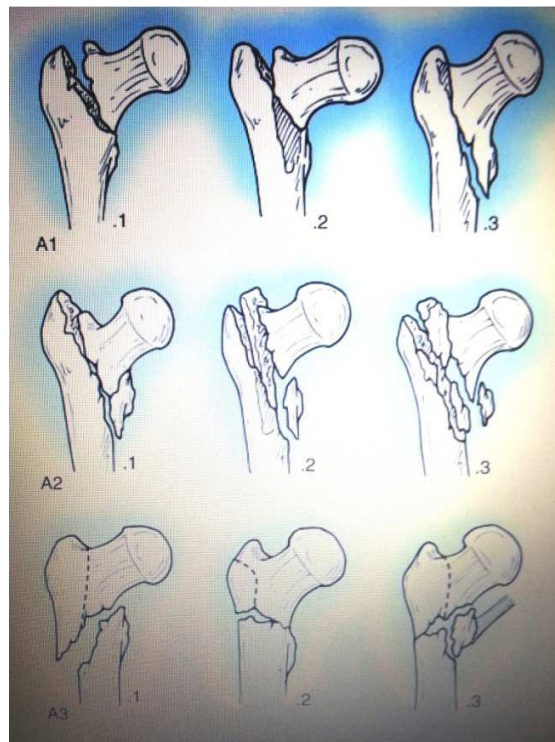
After admission temporary skin traction was applied to relieve pain. To choose proper implant size the fracture geometry was assessed by preoperative planning on X-rays and was operated on elective list. All the fractures were classified according to A.O classification.

Classification

Because of the fracture configuration and the patient heterogeneity no universally accepted classification exists[14]. Many classification systems have been proposed, but AO (1980) and Russell and Taylor's(1992) classifications have been used most commonly. The treatment of the unstable trochanteric fracture has been revolutionised by the development of the long reconstruction nail which was previously difficult to treat. The Russell and Taylor classification has Type I and Type II fractures with sub groups A and B in both. The Type I fracture does not extend into the piriformis fossa. The Type II fracture extends to the greater trochanter and it involves the piriformis fossa. The Type IA fracture line is below the lesser trochanter and the Type IB extension involves the lesser trochanter. The Type IIA fracture extends to the piriformis fossa and the Type IIB fracture involves the piriformis fossa and it extends to the medial femoral cortex and the loss of continuity of the lesser trochanter[1]. The classification is biomechanically sound, it fulfils the criteria best and it was designed to allow the selection of the technique of the internal fixation that produces the most biomechanically sound reconstruction[4]. The extent of involvement of the lesser trochanter, the greater trochanter and the piriformis fossa were taken into consideration.

AO classification [10] is based on the number of fragments and the location and configuration of the fracture line. It classifies the fractures as Type A to type C.

There were 18 (37.50%) type A, 16 (33.34%) and 14 (29.16%) type C fractures according to A.O C lassification.



Time Interval between the injury and surgery ranged between 1-15 days with average 11 days due to late arrival of patients & time consumed for fitness protocol. All the patients were given prophylactic bolus dose of antibiotics to avoid infection. Second or third generation cephalosporin were used pre and postoperatively.

Postoperatively, Static quadriceps exercises were encouraged on the next day of operation. Prophylactic antibiotics second generation or third generation cephalosporins were given Intra-venously for 48-72 hours depending upon the condition of patients and type of surgery. The patients were discharged on the 6th -7th day post operatively. Stitch removal was done on the 14th day. Partial weight bearing was allowed after 15 – 20 days in type A and B fractures and weight bearing was delayed for 6-8 weeks in type C fractures till the appearance of callus on radiograph. Partial weight bearing was advised when the patient could tolerate the pain, with bi-lateral axillary

crutches. Full weight bearing was delayed for 3 months in Type C Fractures, Radiographs were taken at 3 weeks, 6 weeks, 3 months, 6months and 1 year. Strengthening exercises for the quadriceps, hamstrings and the gluteal muscles were done in bed and out of bed under the supervision of a physiotherapist. The range of motion of the hip and knee was examined during the follow-ups. The post operative patients were followed up for 12 months. and assessed according to Radford criteria for functional outcome.

RESULTS AND DISCUSSION

The age, sex and mode of injury distribution is appreciated as in graph 1, 2 and table 2 that indicate M:F ratio as 1.53:1 and the common mode of injury was road traffic accident i.e. 66.66%. Hospital stay in our series was 7-20 days with average time in the hospital 10.2 days. Union of fracture was achieved in 45 (93.6 %) patients out of 48 patients with average union time in 16.5 weeks Ranging from 12 weeks to 22 weeks. Three (6.25) patients had implant failure with non union and 02 (4.16%) deep infection 03 (6.25 %) patients developed varus deformity and subsequent shortening of 03 cm managed by shoe raise. Implant failure patients were managed by repeat surgery and secondary bone grafting. Nonunion was seen in all three patients who developed implant failure cases were 01 case was type B and 02 cases of type C fractures.

According to Radford[11] criteria excellent to good results in 81.5 % in patients fair in 6 and poor results in 3% were achieved.

TABLE I: DISTRIBUTION OF FRACTURES ACCORDING TO A.O CLASSIFICATION MULLER .ET-AL 1990¹⁰.

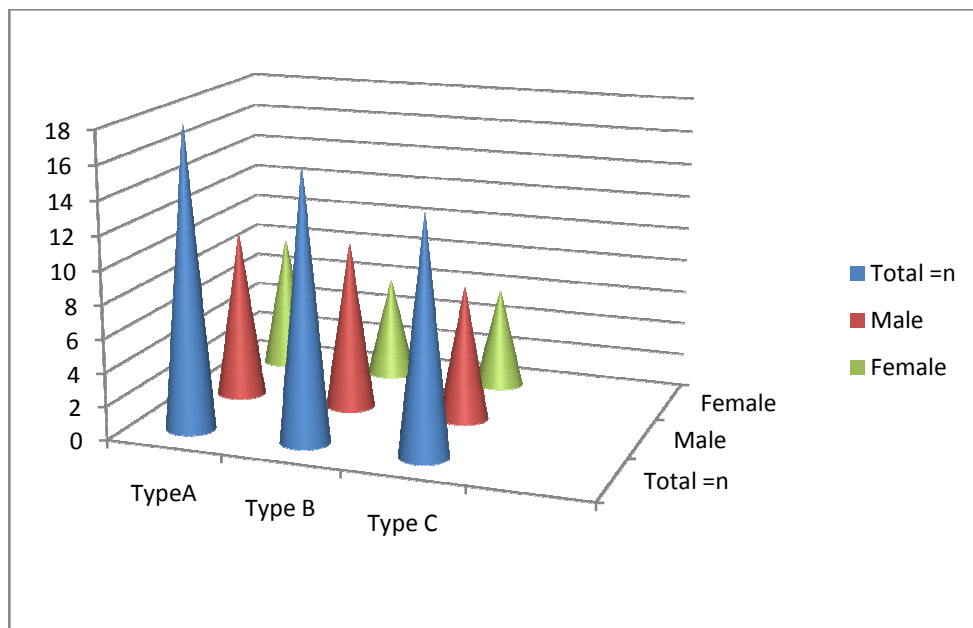


TABLE II: MODE OF INJURY

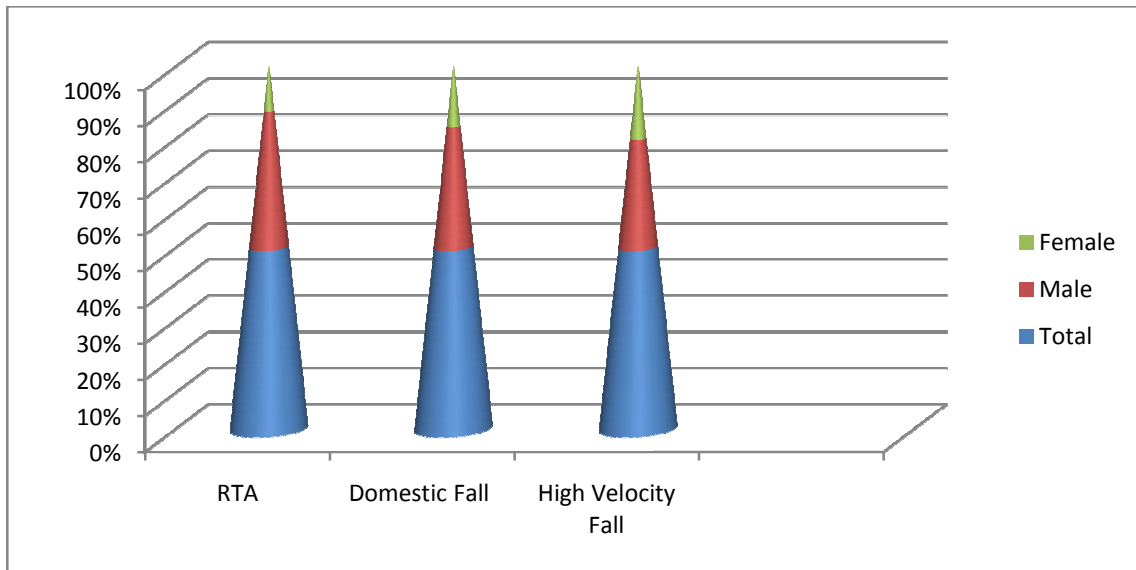


Table III: RESULTS of Subtrochanteric Femoral Fractures Treated by Fixation :

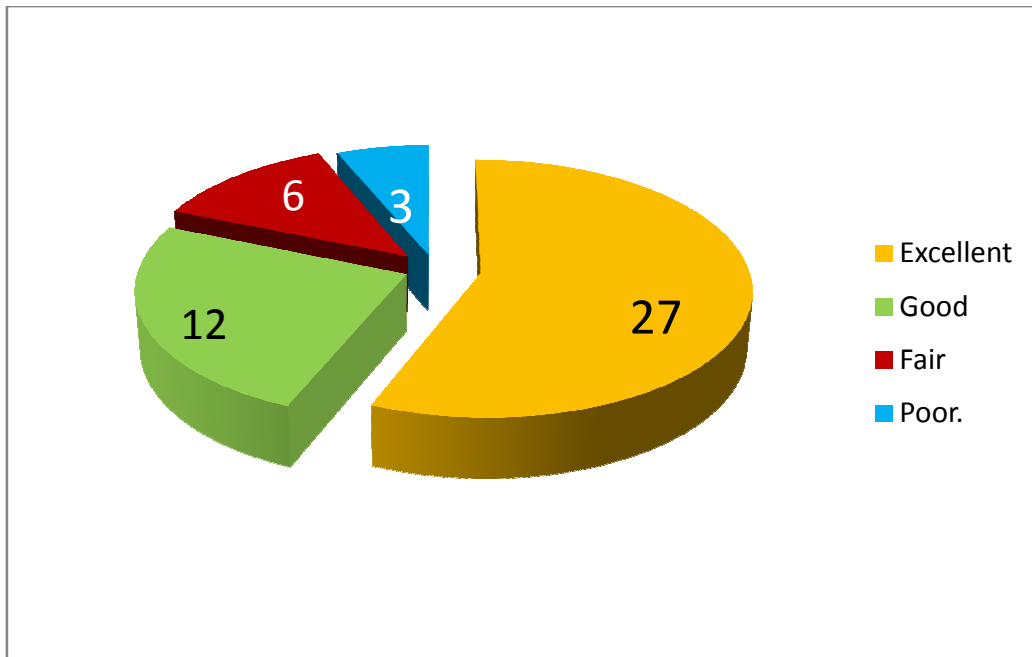


Fig 1 showing showing type3 sub-troc Fracture 1a pre-op, 1b post op ,1c 2 months follow up & 1d showing union in lateral view.

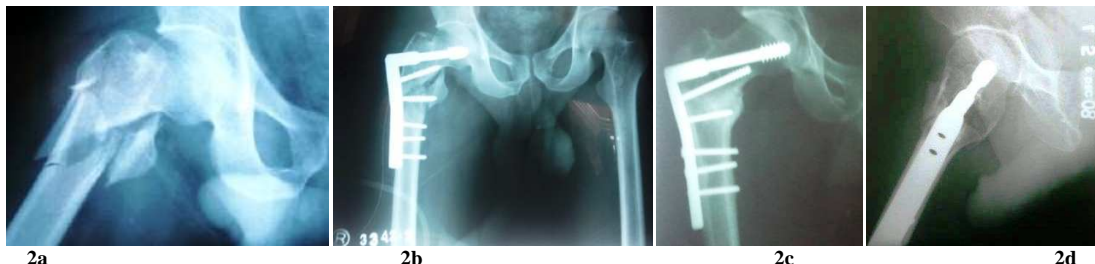
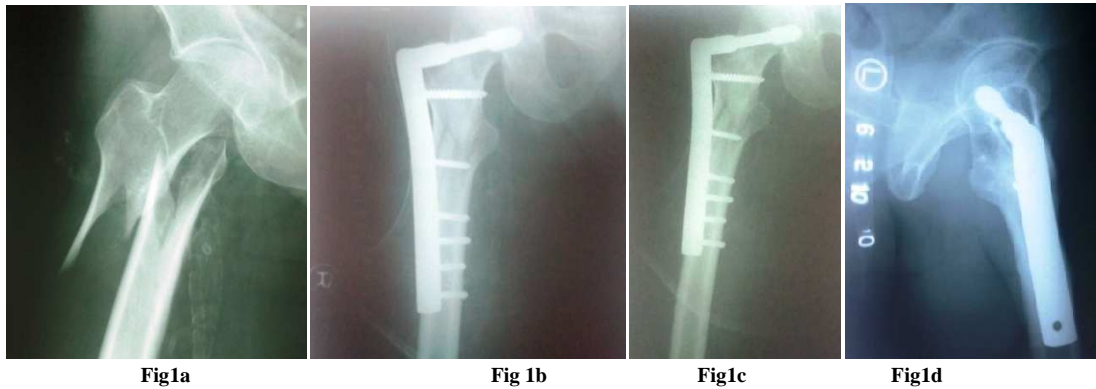


Fig 2 Showing comminuted type3 sub-troc Fracture 2a:- pre-op, 2b:- post op ,2c:- 2 months follow up & 1d showing union in lateral view.



Fig 3 showing clinical photos of the above patient.

Fig 4:- Showing comminuted type3 sub-troc Fracture 4a:- pre-op, 4b:-6 wks follow -up ,4c :- 6 wks follow -up &4d :-showing Excellent clinical results.

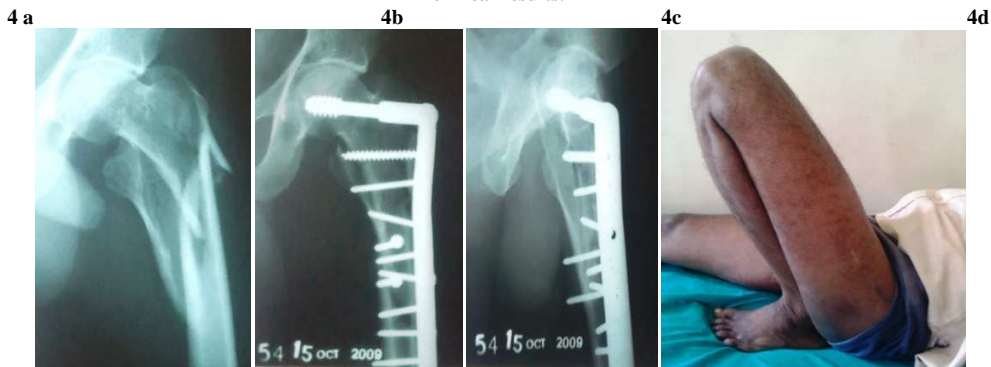


Fig5:- Showing comminuted type3 sub-troc Fracture 5a:- pre-op, 5b:- 6 wks follow-up, 5c :-showing Excellent clinical results.



Fig6 :- Showing a Complication: Of Implant Failure & Back Out.with clinical photograph.

DISCUSSION

Primary goal of subtrochanteric fracture treatment is to achieve rigid fixation and adequate union with optimal functional outcome. Subtrochanteric fractures treatment is debatable as many types of implants are being used. These fractures can be effectively stabilized with 95° angled blade plates, femoral reconstruction nails or trochanteric femoral nails with interlocking options. An accurate reduction and meticulous surgical technique with minimal soft tissue dissection can routinely produce good results [12].

Complication rate for unstable fractures treated with a dynamic hip screw or dynamic condylar screw is high, because of high stresses in this particular zone of proximal femur. We chose the dynamic condylar screw for subtrochanteric fracture fixation, because this is commonly used in our setup. Rohilla [13], Halwai [14], Sharma [15], presented 43, 30 and 25 case series respectively with little difference of average age and achieved 73% to 100% union. However, Sharma used primary bone graft despite that his results could not match. We had 48 patients with average age 44.5 years and union rate was 93.5%. We used direct method of reduction comparable with this case series regarding age. Our results of union rate is lower due to direct method of reduction in our set-up and more cases of type C. Mean time to union was 16 weeks, in our series mean time of union was 16.5 weeks. Our study is comparable with other studies.

Kulkarni et al [16] presented excellent and good results in 77% of patients and failure was high 23% of cases. In this series we achieved 81% excellent and good results. We had failure in 6.25%. Our failure rate is lower than this series. In our series we achieved 81% excellent and good results. We used direct method of reduction in type A and B fractures and did biological type of plate fixation in type C fractures. We recommend DCS, an implant which is appropriate for comminuted type C fractures, complications depend upon the degree of damage to the posterior-

medial cortex of proximal femur we had 6.25 % implant failure and 4.66 % infection rate as we work under the circumstances of conventional operation theaters in our set-up. However our results are comparable with other studies.

CONCLUSION

We conclude that subtrochanteric fractures need open reduction, anatomical reduction, Rigid internal fixation to avoid complications like implant failure, nonunion, infection and mal-union. In our opinion DCS is a Sturdy, Stable & Strong implant especially when there is a lateral Trochanteric cortex blow out & postero-medial subtrochanteric comminution & where Intra-medullary Coxa-femoral Implants are likely to fail.

In our set up we have achieved good results by the use of dynamic condylar screw.

REFERENCES

- [1] Lavelle David G. (2003) Campbells operative orthopaedics 10th edition. Mosby, St. Louis p2897.
- [2] Sims SH (2002) Treatment of complex fractures orthopedics clinics of north America; 33(1):1-12.
- [3] Kyle RF, Cabanela ME, Russel TA, Swiontkoviski, RA Winquist RA, Zukerman JD, et-al fractures of proximal part of the femur. Instructional lecture 1995;227-53.
- [4] Niall J.A Craig. *Disability And Rehabilitation* 2005 vol;27:18 and 19 page 1181-1190.
- [5] Khallaf FGM, Al Rowaih, Abdul Hameed HF. *Principles practice* 1998;7:283-291.
- [6] Wadell JP. *J Trauma August* 1979 19(8):582-92.
- [7] Vaidya SV, Dholakia DB, Chatterjee A. Use of dynamic condylar screw and biological reduction techniques for subtrochanteric femur fractures; *injury* 2003;34:123-8.
- [8] Baumer F, Jurowich B, Taruttis H. Use of dynamic condylar screw in coxal end of femur are there advantages to gerontologic traumatology *zentral-bil m chir* 1992;117(8):460-4.
- [9] Bolden C, Seibert FJ, Fankhauser F, Peicha G, Greichnig W, Szyszkowitz R, The proximal femoral nail (PFN)—a minimally invasive treatment of unstable proximal femoral fractures; A prospective study of 55 cases with follow-up of 15 months. *Acta orthopedic Scand* 2003;74:53-8.
- [10] Muller ME, Nazarian S, Kock Pet-al 1990. the A.O classification of fractures of long bones. Springer, Berlin. P 116.
- [11] Radford PJ, & Howell CJ. *The british journal of accident surgery* 1992;23:89-93.
- [12] Douglas W, Lundy MD. *J Am acad Orthop surg* 2007. Vol,15 No 11:663-671.
- [13] Rohilla R, Singh R, Magu NK, Siwach RC, Sangwan SS, *Journal of Orthopaedic surgery* 2008;16(2):150-5.
- [14] Halwai MA, Dhar SA, Muhammad Iqbal, Butt, MF, Bashir Ahmed Mir, Murtaza Fazal Ali et-al Strategies trauma Limb reconst; 2007 December; 2(2):77-81.
- [15] Sharma V, Sharma S, Sharma N, Singh N & Dong H. *The Internet Journal Of Orthopaedic Surgery* 2010. Vol;11:2 1-13.
- [16] Kulkarni SS, Moran CJ *Injury* 2003;34:117-122.