

Functional Outcome of Nonunion Mid Shaft Tibia With NA (Naseer-Awais) Fixator

Nonunion
Tibia With
NA Fixator

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ABSTRACT

Objective: Management and functional outcome of nonunion mid shaft tibia with NA (Naseer-Awais) fixator.

Study Design: Experimental study.

Place and Duration of Study: This study was conducted at the Orthopaedic Unit at Chandka Medical Hospital/Shaheed Mohtarma Benazir Bhutto Medical University Larkana from January 2012 to 2014.

Materials and Methods: This study was conducted on 70 patients. Both gender between 20 to 40 years having nonunion the follow up was done for 02 years according to (ASAMI) based on clinical& radiological outcome.

Results: Out of 70, 55 (79%) were male, 15 (21%) were female. Male to female ratio 11:3 mean age was 30 years. Right leg (tibia) was involved in 45 (64.29%) patient, left tibia in 25 (35.71%) patient right/left leg ratio was 9:5 DCP 55 (78.57%), interlocking nail 15 (21.43%), pin track infection grade-I 20 (28.57%), headache 10 (14.27%), shortening 3 (4.29%). Results were excellent in 50 (71.43%), good 16 (22.86%) fair 3 (4.2%) and poor in 1 (1.43%). Functional result excellent were 61 (87.14%), good 8 (11.43%) fair 2 (2.86%) patients.

Conclusion: This type of fixation is very cheap, easy available local made less cumbersome and technically easy to apply. Applying compression forces at fracture site after freshening and debridement of ends with bone graft with local version of external fixator and unipolar configuration of this is more comfortable than others light, easy in cleaning, well in outlook, movements at two joints can be easily performed.

Key Words: Functional outcome, Nonunion mid shaft tibia, NA fixator, Road traffic accident

Citation of article: Tunio MZ, Shaikh AM, Tebani KI, Shaikh MA. Functional Outcome of Nonunion Mid Shaft Tibia With NA (Naseer-Awais) Fixator. Med Forum 2017;28(1):18-21.

INTRODUCTION

The tibia is known as shin or shank bone, strong bone in the leg. It is named for greek "aulos" flute recognized as stronger weight bearing bone of body. Diaphyseal tibial fractures are most commonest lower limb fractures and more general to others around world. Though change in tibial fracture with advance in all means of life style and technology it is very vulnerable to the injury.¹ Fracture may damage to the skin, muscles, nerves, blood vessels and ligaments. They have higher risk for problems like infections and gets longer time to heal. Salvage of these challenging problems usually requires staged treatment based on through debridement. Complication usually are delayed union, nonunion, malunion, compartment syndrome,

skin necrosis, skin loss, metallic infection, chronic diaphyseal infection, loosening and breakage of hard metal, needs secondary procedures.² Drainage with broad spectrum antibiotics local soft tissue flaps, packing defect with impregnated beads, in open or close diaphyseal fracture treatment by all technique reported in overall revision rate is 22.4% result in nonunion.³ In 10% cases healing process is delayed, can effect over 30%.^{3,4} Known causes of nonunion are systemic deficits advanced age, diabetes mellitus local impairment of extremity, chronic impairment of blood circulation of soft tissue, the traumatic impacts its self, fracture geometry, degree of soft tissue damage and bacterial contamination of tibia prone it for open fracture less tissue soft coverage that favors for high rate of nonunion and infected nonunion.⁵

These fractures are usually treated with numerous operative procedures with significant signs, laboratory markers of infection parameters and microbiological findings, are usually inadequate for sorting the infection.⁵⁻⁷ These nonunion estimated 2 to 10% of all tibial fracture incidents is greater with high velocity injury and open fracture such as degree of fracture, comminution, bone loss and soft tissue damage. Patient profile also contributes incidents of nonunion. Cigar smoking is well-known factor for delay healing and nonunion and NSAID also inhibits bone healing. Tibial

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Received: November 10, 2016; Accepted: December 25, 2016

diaphyseal fracture do not show enough bridging callus to achieve clinically stability by 16 week are termed as delayed union.⁸ Paley-Herzenberg classified nonunion according to clinical mobility as stiff (<5° mobility), partially mobile (5° to 20° mobility) and flail (20° mobility).⁹ Vascularized fibular graft, transplantation of allograft bone and papineau technique have also advised. Due to the increase in global world population, change in human social living standards number of accident have been increase though better understanding of soft tissue and bone management most of limb are being saved otherwise would have been amputated though it takes time.¹⁰

MATERIALS AND METHODS

This is experimental study conducted from 2012 to 2014 at Orthopaedic Department Chandka Medical College/Shaheed Mohtarma Benazir Bhutto Medical University (SMBBMU) at Larkana Sindh Pakistan. All patients having nonunion admitted through Outdoor department (OPD), Accidents & Emergency (A&E) department of Ortho unit. Patients with mid shaft non union, age 20 to 40 years, DCP Failure, failed interlocking nail and unilateral limb were included. Those patients who have congenital deformity, gap nonunion >2.5cm, infected nonunion with un operable skin and uncontrolled infection were excluded. All patient included in the present study were fully systematically and clinically assessed and local examination of effected limb, counseling, (informed for the respective procedure consent (Verbal/written) taken) in detail i-e surgical technique, alternative producer, respective advantages and disadvantages were informed. Analgesic, 1/V antibiotics, prophylaxis against tetanus were given, all patient received standard protocol preoperatively. Investigation marker such as CBC, ESR- C-Reactive protein culture swab was taken for gram staining culture and sensitivity, biopsy, standard X-rays views (AP and lateral view joint above and below) were taken under spinal anesthesia, under tourniquet control and aseptic measure hardware DCP, Nail removed, ends delivered and freshened curettage, debridement and nibbling done till the paprika sign appeared alignment done and according to principles N.A fixator applied compression given on bone, graft harvested in all patients drain in placed routine 1/V Broad Spectrum antibiotic an according to culture and sensitivity given. Patient mobilized on next day after evaluation of wound follow was done for two years to achieve clinical outcome was based on table 01 for union. On each follow up visit patient evaluated both clinically and radio logically for callus formation at fracture site, pin site stability of frame compression and limb examination, contracture, equines deformity checked. Fixation was removed after corticalization and consolidation of union with appearance of hard bridge of bone either sides of cortexes, after removal of frame

PTB Cast applied mobilization with and without crutches physiotherapy started initially and later on under supervision of physiotherapist.

RESULTS

There were 55 (79%) males and 15 (21%) females with male to female ratio 11:3. Mean age 30 years. Right leg (tibia) was involved in 45 (64.29) patient, left (tibia) in 25(35.71%) patient right/left leg ratio was 9:5, DCP 55 (78.57%), interlocking nail 15 (21.43%) pin track infection grade-I 20 (28.57%). Bone results were excellent in 50 (71.43%), good 16 (22.86%), fair in 3 (4.2%) and poor in 1 (1.43%). Functional result excellent in 61 (87.14%), good 8 (11.43%) fair 2 (2.86%) patients due to RTA motor bike injury. Prominent and dominant was right leg. There was three days hospital stay due to short of beds did not kept for longer time in ward. (Follow up was 0 to 06 months, 07 to 12 and every year. All patient received spinal anesthesia as previously has been operated under same kind of anesthesia in 10 (14.27%) patient developed headache due to their uncooperative attitude for maintaining supine position which was managed accordingly with anesthetic personals. Fibular osteotomy and bone grafting was performed in all patient during surgery. Ankle foot orthosis was applied for fully day then in night to prevent equines deformity. None of patient found any knee or ankle joint laxity, or stiffness none of them reported for any kind of pain, numbness, difficulty in sleeping, walking or running and attended full range of movement at both joints. 3 (4.29%) patients observed 1.5cm shortening due to nibbling and refreshing of bone. Active and passive physiotherapy was started earlier under the supervision of physiotherapy department. After complete union, dynamization of fixator done then removed under 1/V sedition full above knee cast applied.

Table No.1: Demographic information of the patients

Male	55 (79%)
Female	15 (21%)
Male/female ratio	11: 3
Mean age	30 years
Right leg	45 (64.29%)
Left leg	35.71
Right/left leg ratio	9: 5
DCP	55 (78.57%)
Interlocking nail	15 (21.43%)
Pin track infection grade-I	20 (28.57%)
Headache	10 (14.27%)
Shortening	3 (4.29%)

On each visit stability of frame and its accessories checked and tightening. 20 patients (28.57%) hade Grade-I superficial pint tract infection no any compartment syndrome, pin loosening, equine deformity noted and none required secondary intervention (Table 1). Functional results were excellent

in 50 (71.43%), good in 16 (22.86%), fair 3(4.28%) and poor in 1 (1.43%) in this region 80% after the 1st subsequent surgery functional result were excellent 61 (87.14%), good 8 (11.43%) fair 2 (2.86%) and poor 0 (Table 2).

Table No.2: Functional results of the patients

Result	Excellent	Good	Fair	Poor	Failure
Bone	50 (71.43%)	16 (22.86%)	3 (4.2%)	1 (1.43%)	None
Functional	61 (87.14%)	8 (11.43%)	2 (2.86%)	-	None

DISCUSSION

Famous saying of Mr. Iizarov that "Infection burns in the fire of regenerate".¹⁰⁻¹² Post traumatic tibia nonunion, infections are most challenging task and headache for the Orthopaedic Surgeon as review of many research articles details for new technique of fixation the most common treatment is radical debridement, removal of loose and sequestered bone until live and bleeding bone is reached know as "Paprika Sign".¹³ Bone transport flap and application of stable fixation and soft tissue replacement encourage bone union. Standard and circular External fixation are often heavy discomfort able found them aesthetically unacceptable.¹⁴ Majority of our patient sustained road traffic accident (RTA) assault and right tibia was involved in 45 (64.29%) study conducted in Nigeria 2004 results reveals road traffic injuries are similar to our society due to rising trends in all over world specially third world countries due to illegal driving, Miss conduct of law, poor road condition and safeties, impatient and over speeding.⁴ Most of research reveals male sex are commonly involved.^{14,15} Right leg is dominate in all persons used as flight are flight to save or escape from danger this study 55 (79%) were male. Paley reported bone grafting 11%.¹⁶ In our study in 100% bone graft. Study conducted at Xiangya University Hospital in China shows 20 patient with pin tract infection that is similar our results.¹³ Pasha and Iqbal¹⁷ reported 10.2% and 38% respectively study at Abbottabad Pakistan show 08% equinus foot noted in 04 (20% study conducted GMMMC) Hospital in Sukkur¹¹ Pakistan reveals with 3 patient equinus at 6 patient knee and ankle joint stiffness study conducted by Tranquilli et al¹⁸ in Italy 20 patient achieved union all patient cases with average time of 4.5 months with illizarov. Dendrions¹⁹ achieved union in 9.4 months, Paley got 10.6 months with bone transport. Marsh et al²⁰ reported et al observed union in 40 out monolateral conventional external fixator. Denndrions et al¹⁹ reported 4 (16%) mail-alignment with Multiplan Iizarov external fixator. Comparing to these study our results are quit excellent with no mail-alignment, limb lengthening discrepancy, loosening, and knee or ankle stiffness and displacement noted.

CONCLUSION

This type of fixation is very cheap and easy available, local made, less cumbersome and technically easy to apply. Compression or distraction, or transport can be done. This type of fixation but only applying compression forces at fracture site after freshening and debridement of ends with bone graft local version of external fixator, NA (Nasser-Awais) because it has threatened rods are used for compression to achieve excellent results. Uniplanar configuration of this fixator more comfortable than others i.e light, easy in cleaning, well in outlook movements at two joints can be easily performed. Fixation is cheap short learning for PG student full weight bearing on limb is admitted as others, easy with hand drill, good range movements. This study is adding our knowledge that with in local circumstances better can be done for poor outcome in post-traumatic nonunion of tibia soft tissue envelope below knee joint, high energy trauma unfavorable blood supply, complex fracture geometry which contributes in unfavorable outcome in nonunion of tibia. In the last concluded and we advise to improve the configuration where it causes difficulty in maintaining the position while reduction and insertion.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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