

## Original Article

# Nailing fracture shaft both bone forearm in adults – using rush rod : a retrospective study

Amiya Kumar Bera<sup>1</sup>, Amarendra Nath Roy<sup>2</sup>

Plating fracture both bone forearm (FBBFA) is gold standard but closed nailing using solid nails, age old practice is still continuing in this region mainly for economic patients. So how much effective is this closed nailing - aim of our study. Retrospective study on 100 cases of closed nailing was carried out on 100 cases of closed nailing with Rush rod in adult FBBFA, from 2006 to 2012. Assessment of results was carried out using Anderson classification, and patient reported quick DASH score. With more than 80% good results achieved, this biological method was found to have acceptable technique with fewer infection compared to plating. [J Indian Med Assoc 2018; 116: 37-8]

**Key words :** Plating fracture both bone forearm.

Gold standard of fracture both bone forearm (FBBFA) is plating – as it maintains beautiful & unique hand function of mankind by anatomical maintenance of ulnar and radial bow: later having radial & dorsal bows.

The average incidence 1.35/10,000 population yearly reported in Western literature<sup>1</sup> predominantly male, mean age 24-37 years: majority first four decades of life.

Intramedullary nailing of FBBFA started over a century, abandoned for lack of rotational instability, gave way to plate fixation with absolute stability and perfect anatomical reduction, solid nails were replaced by interlocking nails nowadays. Modern interlocking nails for FBBFA still need pop immobilization for 6 weeks and high incidence of posterior interosseous nerve injury. Plating, with its steep learning curve has its own complications also of open reduction, extensive periosteal stripping, nerve injury, infection. Nailing with its biological advantages, easily available Rush rod is very much economical with its long history of its use, less demanding; closed nailing with solid nails in third world countries are still done and several studies are there<sup>2-5</sup>. Done over 25 years, open nailing is nowadays replaced by closed nailing with clear advantages.

### AIMS AND OBJECTIVES

To study efficacy of closed nailing adult FBBFA using Rush rod.

### MATERIAL AND METHOD

Out of more than 500 cases done over last 25 years, 100 cases of nailing FBBFA in adults were included, done from 2006 to 2016 in private set up by single surgeon, with minimum 1 year of follow up – closed nailing with Rush rod. It's a retrospective study.

### IMPLANTS

Easily available stainless steel made Rush rods of 2.0 -

Department of Orthopaedics, Mursidabad Medical College, Mursidabad 742101

<sup>1</sup>MS (Ortho), Assistant Professor

<sup>2</sup>MS (Ortho), Assistant Professor and corresponding author

3.5mm diameters were used for economic reason. Nail tips were bent before insertion for negotiating and aligning fractures. Length was determined from normal side preoperatively – 3-5 mm shorter from end to end to allow collapse. Operative procedure-with patient supine, traction bar attached to side bar to provide non-variable counter traction, reduction by longitudinal traction achieved easily with needed side-to-side force by other assistant. Entry portal for ulna 5mm in front of posterior margin of olecranon, for radius radial styloid or just lateral to Lister's tubercle in case of fracture lower end of radius. Less comminuted bone/ ulna first, then radius/other bone fixed with Rush rod. Very rarely mini-open technique followed in cases of failure of closed method. POP slab applied, above elbow, after stitch removal cast done continue for 8 weeks, molded to maintain interosseous space.

Follow up at 4 weeks, 8 weeks, 16 weeks, 24 weeks & 1 year was done and Postoperative assessment of movement at 12 months recorded with goniometer. Bridging callous across 3 cortices with clinical features was taken into consideration to declare union of fracture, union beyond 16 weeks but within 6 months was taken as delayed union and if fracture remain un-united by 6 months as non-union. Grip strength and functional assessment was done at 1 year using quick DASH score. Statistical analyses was done using 17.0 Windows SPSS version. Results were graded with Anderson's criteria.

### RESULTS

Mean age of patients studied was 33.3 (18-87 years); male 54%, female 46%; road traffic accident (43%) followed by household accidents (39%) was common mode of injury; right side 47%, left side 53%. Short oblique and transverse fractures mostly, middle third fractures mostly 65%, followed by distal third (25%), proximal third 10%.<sup>9</sup> cases of open fracture : Gustillo-Anderson type I -5, Type II- 4 cases. In 7 cases needed mini-open reduction in one bone. Average operating time was 27 minutes (range,



Fig 1 — Postoperative X-rays show even with Rush rod anatomical bows are maintained

17mins to 45min), hospital stay 3 days (2-6) days. There were 4 cases (4%) of infection— superficial 3, deep 1. All 3 cases of superficial infection were healed after adequate management but in case of deep infection nail had to be removed, debrided, pop applied: plating & bone grafting was done and it united at 17th month.

Average time of union 13.2 weeks (range: 12-35 weeks). Nonunion was in 4 cases: in 3 cases of ulna, one case of radius — managed with bone grafting in 3 cases and plating with bone grafting with 1 case. Delayed union 16 cases — but surprisingly all of them could continue their works and united even at 9th month Nail migration was found in 3 cases found after removal of pop cast, except the case with deep infection others united with additional cast support after removal of nail. Results were classified with Anderson's criteria (Table 1) and found to be Excellent - 71.5%, satisfactory 27%, unsatisfactory 4.5% poor 2%.

#### DISCUSSION

Plating both bone fracture forearm is gold standard, with its distinct advantages of maintaining anatomical bowings with rotational control and early mobility but it has its own disadvantages not only technically demanding but also there are chances of nerve injury, stiffness. Infection, synostoses<sup>6</sup>. In standard textbook, nailing has been dropped apart from few situation<sup>7</sup> references taken by Judiciary in cases of legal disputes : we treat Indian patient in Indian scenario but judged by Western standard.

But biological nailing has less infection, much less time needed, economical, easy technique and equally acceptable results with fewer /less complications including infection<sup>4-6</sup>. We have also in our study high success rate - 96 % union rate. With tissue pressure, muscle tone natural curvatures are maintained many a time even with Rush rod (Fig 1), even with alteration of curvature movement loss is not remarkable (Fig 2). Interlocking nailing has its advantages but its costly, not easily available, and it has its disadvantages including chance of Posterior in-

terosseous nerve injury. On the contrary, with unforgiving plating stiffness is much more compared to nailing—most likely for extensive dissection needed, more fibroses occurs and therefore without adequate physiotherapy movement frequently not regained. Even in developed countries plating has been combined with interlocked nailing therefore<sup>8</sup>. Present day interlocked nails still needs some form of post-operative immobilization upto 6 weeks<sup>1</sup>. However in our study we have not found significant permanent derangement for 8 weeks of immobilization.

We have some weaknesses in our study —retrospective study, randomized prospective study should be undertaken.

#### CONCLUSION

Closed nailing in adult both bone forearm is a biological useful method of treatment with acceptable result with its economic advantage and should be considered standard care.

#### REFERENCES

- 1 Fractures in Adults — Rockwood and Wilkins—Seventh Edition.
- 2 Nadeem A Lil — Results of closed Intreamedullary Nailing using Talwarkar Square Nail in Adult Forearm Fractures. *Malaysian Orthopedic Journal* 2012; **6**: 3.
- 3 N Brahma Chary, Ajay Kumar Pandey, Narayana Prasad — A study of Diaphyseal Fractures of Forearm Bones With Nailing And Plasting. *Sch J App Med Sci* 2017; **5**: 180-3.
- 4 Tabet A, Al-Sadek, Desislav Niklev, Ahmed Al-Sadek — Open Access Macedonian. *Journal of Medical Sciences* 2016; **15**: 670-3.
- 5 Ghosh S, Chowdhury A, Chaudhuri A, Datta S, Singha Roy D, Singh A — Rush nail and management of fracture both bone forearm. *J Sci Soc* 2014; **41**: 167-72.
- 6 Daniel J Westacott, Robert W Jordan, Stephen J — Cooke Functional outcome following intramedullary nailing or plate and screw fixation of paediatric diaphyseal forearm fractures: a systematic review. *J Child Orthop* 2012; **6**: 75-80, DOI 10.1007/s11832-011-0379-6.
- 7 Sang Bum Kim, Youn Moo Heo, JinWoong Yi, Jung Bum Le, Byoung Gu Lim — Shaft Fractures of Both Forearm Bones: The Outcome of Surgical Treatment With Plating only and Combined Plating and Intramedullary Nailing, kim et al. plating vs. plating with Intramededullary Nailing for Bilateral Forearm Shaft Fractures. *Clinics in Orthopedic Surgery* 2015; **7**: 3.
- 8 Moerman A, lenaert, D de Coninck, L haeck, S Verbeke, D Uyttendaele, R Verdonk — Intramedullary Fixation of Forearm Fractures in adults. *Acta Orthopaedica Belgica* 1996; **62**: 1.
- 9 Byung Sung Kim, Yong Sung LEE, Sung Yong Park, Jae Hwi Nho, Sun Geun Lee, Young Hwan Kim — Flexible Intramedullary Nailing of Forearm Fractures at the Distal Metadiaphyseal Junction in Adolescents . Kim *et al.* Flexible Intramedullary Nailing for Distal Fractures in Adolescents. *Clinics Orthopedic Surgery* 2017; **9**: 1.

Table 1 — Results of closed intramedullary nailing vs plate osteosynthesis in diaphyseal fractures of both bones forearm in adults			
Result	Union	Flexion-extension of wrist	Supination and pronation
Excellent	Present	<10° loss	<25% loss
Satisfactory	Present	<20° loss	<50% loss
Unsatisfactory	Present	<30° loss	>50% loss
Failure	Non-union	with without loss of motion	