

**Humeral Mid-Shaft Fracture with Primary Radial Nerve Palsy - Posterior Approach: A Case Series**S. Rajasekaran<sup>1</sup>, T.C. Premkumar<sup>2</sup>, M.F. Mohamed Rifan<sup>3</sup><sup>1</sup>Associate Professor, Department of Emergency Medicine, Government Theni Medical College, Theni<sup>2</sup>Associate Professor, Department of Orthopaedics, Government Theni Medical College, Theni<sup>3</sup>Senior Resident in Anaesthesia, Department of Emergency Medicine, Government Theni Medical College, Theni

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Conflict of interest: Nil

**Abstract:**

**Introduction:** Radial nerve injury is one of the most common peripheral nerve palsies associated with a fracture of the humeral shaft. Early nerve exploration is only recommended in proven radial nerve injury rather than neuropraxia. The purpose of this case series is to analyse the advantage of posterior approach in the treatment and outcome of primary radial nerve palsy, in surgically treated humeral shaft fractures in Govt Theni Medical College Hospital. Materials and methods: All patients who had humeral shaft fractures with primary radial nerve palsy presented to Govt Theni Medical College Hospital during the period from March 2021 to August 2022 were included in the study. All cases were done under interscalene block given under USG guidance. Fracture fixation was done with plate osteosynthesis by posterior approach. Post operative check x ray was taken assess the fracture reduction. Follow up was done bimonthly during the first 3 visits and monthly thereafter for a period of 6 months. Results: Among the 32 patients with humeral shaft fractures associated with primary radial nerve palsy, 22 (69%) showed successful recovery of the motor function within 6 months follow up. 4 patient showed partial recovery of motor function after 6 months and they were further followed for another 3 months. 4 patients had complete radial nerve palsy who were referred for reconstructive surgery to the plastic surgery department. 2 patients lost follow up. Conclusion: Posterior approach for plate osteosynthesis holds a better approach in managing shaft of humerus fractures with primary radial nerve palsies with better outcome and recovery.

**Keywords:** Fracture shaft of humerus, Posterior approach, Primary Radial Nerve palsy.

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**Introduction**

Radial nerve injury is one of the most common peripheral nerve palsies associated with a fracture of the humeral shaft [1–4]. The overall incidence of radial nerve palsy in patients with humeral shaft fracture is between 7 and 17%, according the literature, [3]. Spontaneous recovery in patients with primary radial nerve injury is a widely accepted strategy: Early nerve exploration is only recommended in proven radial nerve injury rather than neuropraxia [1, 6, 9–11]. The purpose of this case series is to analyse the advantage of posterior approach in the treatment and outcome of primary radial nerve palsy, in surgically treated humeral shaft fractures in Govt Theni Medical College Hospital.

**Materials and methods**

After the ethic committee approval, all patients who had humeral shaft fractures with primary radial nerve palsy presented to Govt Theni Medical

College Hospital during the period from March 2021 to August 2022 were included in the study. All cases were done under interscalene block given under USG guidance. Fracture fixation was done with plate osteosynthesis by posterior approach. A linear incision was made in posteriorly, fractured segments were reduced and internally fixed by using locking plate and screws. By the posterior approach, the radial nerve can be visualised for any damage or contusion of the nerve. If the nerve was found entrapped in the fracture segment or in soft tissue, manual release of the nerve was done.

After fixation, wound closed in layers leaving a suction drain. All patients were given an intraoperative steroid (Inj. Dexamethasone 8mg IV) and another dose after 6 hours.

Post-operative check x ray was taken for satisfactory fracture reduction. Follow up was done bimonthly during the first 3 visits and monthly

thereafter for a period of 6 months for assessing the fracture healing and nerve function recovery.



Figure 1: Fracture shaft of Humerus



Figure 2: Posterior approach – Radial Nerve intact

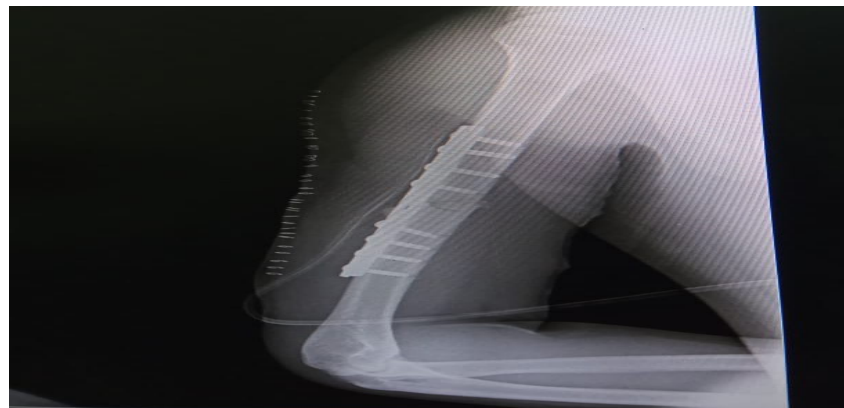


Figure 3: Plate osteosynthesis by posterior approach

**Results**

**Table 1: Sex distribution**

Sex	Number of patients	Percentage
Male	18	56%
Female	14	44%

**Table 2: Age distribution**

Age (years)	Number of patients	Percentage
20-39	8	25%
40-59	14	44%
>60	10	31%

**Table 3: Mode of Injury**

Mode of Injury	Number of patients	Percentage
Road traffic accident	23	72%

Self-fall	9	28%
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**Table 4: Radial nerve palsy**

Radial nerve palsy	Number of patients	Percentage
Complete recovery	22	69%
Partial recovery	4	12.5%
Complete palsy	4	12.5%
Lost follow up	2	6%

During the period, a total of 32 patients with fracture of the humeral shaft associated with primary radial nerve palsy identified by clinical examination were taken for surgery with internal fixation and plate osteosynthesis by posterior approach as a definitive treatment. Among the 32 patients 18 were male and 14 were female patients. (Table 1). Based on the age group, 8 out of 32 belong to age group 20-39, 14 out of 32 belong to 40-59 and 10 out of 32 belong to > 60 years (Table 2). Regarding the mechanism of injury 23 patients suffered fracture due to trauma due to road traffic accident while 9 patients by self-fall (Table 3). Pathologic fractures are not included in the study. Among the 32 patients with humeral shaft fractures associated with primary radial nerve palsy, 22 showed successful recovery of the motor function within 6 months follow up. 4 patient showed partial recovery of motor function after 6 months and they were further followed for another 3 months. 4 patients had complete radial nerve palsy who were referred for reconstructive surgery to the plastic surgery department. 2 patients lost follow up (Table 4).

#### Discussion

Complete recovery of nerve function was high in our study (69%) after undergoing plate osteosynthesis through posterior approach for primary radial nerve palsy associated with humeral shaft fractures. According to Yihan Li et al [12], anterolateral approach is better than posterior approach in satisfactory fixation. But when it comes to the management of fractures with primary radial nerve palsy, posterior approach will be a better option according our study. The posterior approach has the advantage of manual visualisation of the radial nerve, its structural damage, nerve entrapment in soft tissues or fracture fragment. Decompression can also be done with the posterior approach if any. If radial nerve palsy occurs with an open fracture of the humeral shaft, the nerve should be explored at the time of debridement of the wound. It has been stated that in cases of acute primary radial nerve palsy in traumatic humeral shaft fractures, open reduction facilitates fracture treatment and simultaneous exploration of the radial nerve to determine the extent and the type of lesion [13,15]. However, radial nerve palsy is often caused by simple nerve contusion or stretching with the nerve being found usually macroscopically

intact [9]. In such cases the recovery will be good which can be guessed earlier when the approach for fixation is posterior.

A doubt arises whether the recovery rate would have been the same without intervening the radial nerve, but the surgical exploration / rehabilitation can be postponed, a wait and watch strategy can be adopted if the radial nerve was examined intraoperatively. If the radial nerve is found to be transected or damaged the patient can be referred for early reconstructive or rehabilitation measures can be initiated. Since secondary nerve palsies undergo nerve exploration early after trauma, a statement about the outcome without early exploration cannot be made. Thus, management of primary nerve palsies by posterior approach intraoperatively mimics management of secondary nerve palsies.

#### Conclusion:

In conclusion, a wait and watch strategy adopted for shaft of humerus fractures for a potentially compressed or damaged radial nerve is obsolete. Making a decision to explore a radial nerve or not is much difficult when the approach is anterolateral. Thus, posterior approach for plate osteosynthesis holds a better approach in managing shaft of humerus fractures with primary radial nerve palsies with better outcome and recovery.

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