

Effect of Early Physiotherapeutic Approach After Surgical Treatment of Osteochondroma: A Case Report

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Abstract:

Osteochondroma is one of the most frequently found benign bone neoplasms which occurs as a result of increased enchondral ossification at the metaphysis of long bones. An eight year old female diagnosed with benign osteochondroma of distal end of right radius was treated in the form of surgical excision of the tumor. Following surgery the patient had decreased range of motion, grip strength, and muscle strength. A physiotherapy protocol was formed personalized according to the needs of the patient focusing on patient counseling, pain reduction, improvement of range of motion, grip strength and muscle strength. Numerical Pain Rating Scale, Patient Evaluation Measure and grip strength were the primary outcome measures, whereas range of motion and muscle strength were the secondary outcome measures. This case report concluded that there was definitive improvement in all the outcomes following physiotherapy. Thus, early physiotherapy rehabilitation is suggested for such patients to hasten the recovery.

Keywords: osteochondroma, bone tumor, physiotherapy, rehabilitation, surgical treatment.

Introduction:

Osteochondroma is most frequently found primary benign bone tumor of cartilaginous origin. It accounts for 36 to 41 percent of all tumors [1,2,3]. It is most commonly seen between 10 to 30 years of age [4,5]. Solitary osteochondroma (single lesion) and multiple exostoses (multiple lesions) are the two common clinical manifestations [1,6]. It occurs as a result of increasing enchondral ossification of an expanding cartilaginous cap, commonly seen at the metaphysis of long bones during the growth spurts [4,7].

Osteochondromas are generally asymptomatic with a painfree, slow growing lump as the only clinical symptom which can lead to mechanical irritation, damage to the soft tissues and vessels, pathological fractures, compression of the peripheral nerve and spinal cord, etc [4,8]. The common sites of affection are distal femur, proximal tibia, and proximal humerus [9,10]. Surgical excision is the most common treatment

procedure followed in asymptomatic and uncomplicated cases of osteochondroma [11]. Following excision, physiotherapy plays a major role in the prevention of secondary complications and early recovery [12]. And there is lack of evidence in the above-mentioned matter. Hence, the need of this study is to provide an overview of the physiotherapeutic approach in a case of Osteochondroma.

Case Presentation:

An eight year old female student residing in a village had a history of mild swelling over right distal forearm at the age of two years which slowly increased in size with her age. After one year, swelling also started developing over the left fifth metatarsal and left index finger. With the above complaints, the patient had visited a nearby hospital where just the medications were given. But as the patient was asymptomatic and was able to carry out the functional activities, the relatives ignored the condition. After six years, the swelling increased in size enormously and became bony in nature which led to Range of Motion (ROM) restrictions, so they consulted the local hospital again after which she was referred to Dhiraj General Hospital (DGH). At DGH, investigations were done in the form of X-ray which was indicative of multiple sessile exostosis involving distal end of right radius communicating with the medullary cavity (Figure 1), distal end of proximal phalanx of left index finger (Figure 2), and distal end of fifth metatarsal of left foot (Figure 3). For further evaluation histopathological report was done, and the patient was diagnosed as a case of Benign Osteochondroma of distal end of right radius (Figure 4).

Figure 1: X-ray indicating exostoses of distal end of Right radius

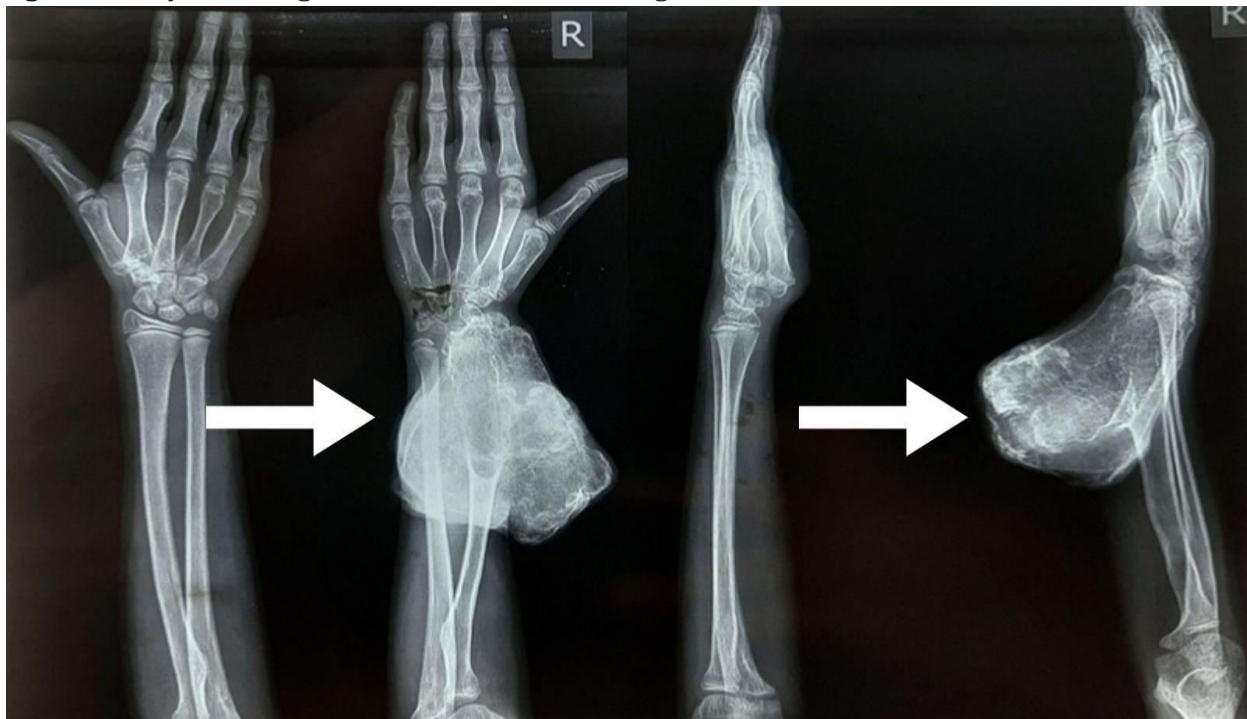


Figure 2: X-ray indicating exostoses at distal end of the proximal phalanx of the left index finger.

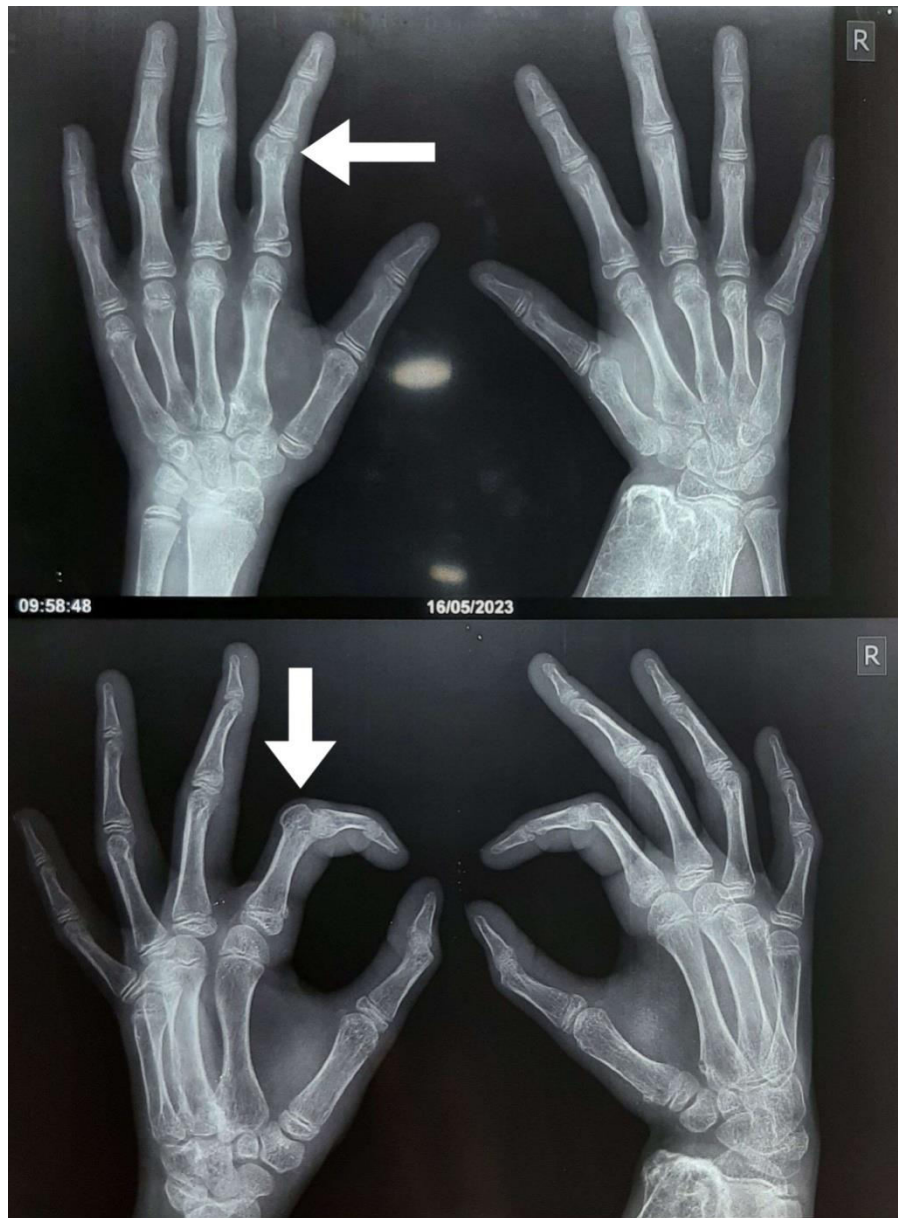
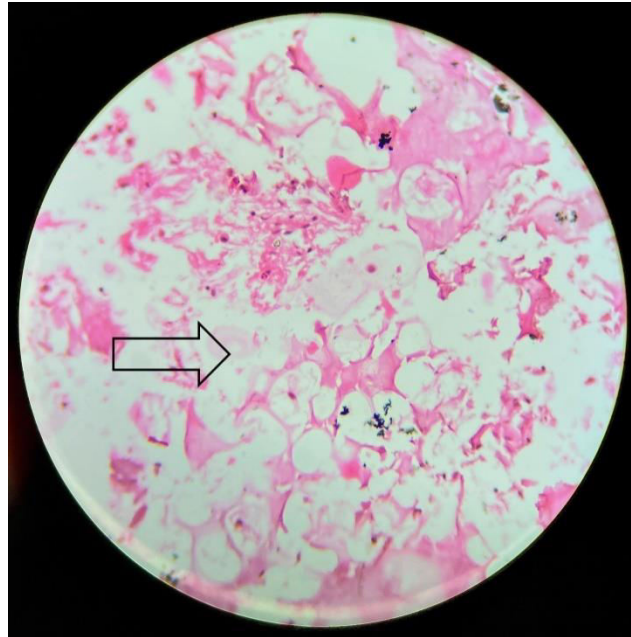


Figure 3: X-ray indicating exostoses at distal end of the fifth metatarsal of the left foot.



Figure 4: Histopathology report indicating Osteochondroma



Swelling was non-tender, non-pulsatile, non-fluctuating, immobile, irregular in shape, and hard in consistency with ill-defined border and edge. The size of the swelling was 7*7*6 cm³(Figure 5).

Figure 5: Hard swelling at distal end of Right radius



Pre-operative assessment indicated terminal restrictions in range of motion of wrist and forearm with a muscle power of four within the available range. Surgery was done in the form of tumor excision on 30/05/2023 and was referred for physiotherapy on 31/05/2023. Post-surgery, a drainage tube was kept for four days and the patient was on NSAIDs and antibiotics.

The timeline of events is given in (Table 1).

Table 1: Timeline of events.

Events	Date of events
Date of admission	16/05/2023
Date of surgery	30/05/2023
Physiotherapy reference	31/05/2023
Date of discharge	15/06/2023

Clinical Findings:

A comprehensive physiotherapy assessment was done after taking an informed consent. The patient had complaint of pain over the incision site and difficulty in gripping activities after the surgery. The X-ray of the patient post-surgery is given in (Figure 6). The patient had a slouched posture after the surgery due to the weight of the cast (Figure 7).

Figure 6: Post-operative X-ray indicating the excision of the tumor.

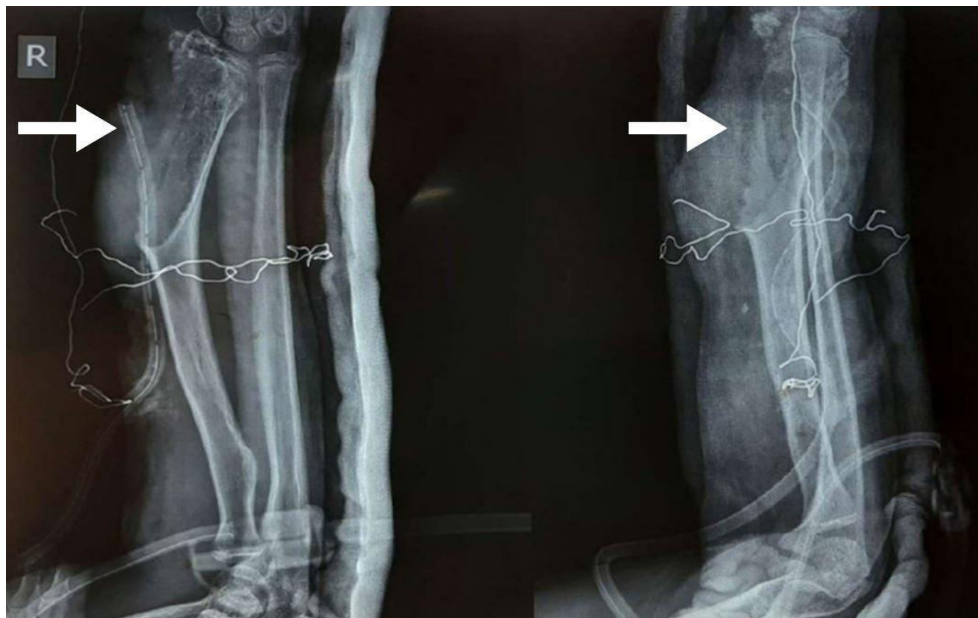


Figure 7: Attitude of patient's limb.



Numerical Pain Rating Scale (NPRS), Patient Evaluation Measure (PEM), and Grip strength were the primary outcome measures. All the outcomes were assessed prior surgery, on first Post-Operative Day (POD) and on discharge. Improvements were seen in all the outcome measures (Table 2, 3).

Table 2: NPRS and PEM Questionnaire scores prior surgery, on first POD and discharge

* NPRS- Numerical Pain Rating Scale, PEM- Patient Evaluation Measure, POD- Post Operative Day

	Prior surgery	On first POD	On discharge
NPRS- Rest	0/10	4/10	0/10
NPRS- Activity	0/10	7/10	3/10
PEM Questionnaire	73/133	70/133	36/133

Table 3: Grip strength assessment prior surgery, on first POD and discharge

*POD- Post Operative Day

Grip	Prior surgery		On first POD		On discharge	
	Right	Left	Right	Left	Right	Left
Large cylindrical	Good	Good	Fair	Good	Good	Good
Small cylindrical	Good	Good	Poor	Good	Good	Good
Spherical	Good	Good	Fair	Good	Good	Good
Hook	Good	Good	Fair	Good	Good	Good
Lateral prehension	Good	Good	Fair	Good	Good	Good
Pulp to pulp	Good	Good	Poor	Good	Good	Good
Tip to tip	Good	Good	Poor	Good	Good	Good
Three jaw chuck pinch	Good	Good	Poor	Good	Good	Good
Lumbrical grip	Good	Good	Poor	Good	Good	Good

Range of motion and Manual muscle strength were taken as the secondary outcome measures. On the first POD, the elbow and wrist ranges were not assessed as it was under bandage. The shoulder, metacarpophalangeal, and interphalangeal joint ranges were full and free prior the surgery as well as after the surgery. The positive findings in the range of motion and muscle strength are mentioned in the tables below (Table 4, 5).

Table 4: Range of motion measurements at baseline and discharge

Movements		Baseline (Prior surgery)				Discharge			
		Left		Right		Left		Right	
		Active	Passive	Active	Passive	Active	Passive	Active	Passive
Elbow	Flexion	0-135°	0-138°	0-110°	0-113°	0-135°	0-138°	15-120°	10-125°
	Extension	135-0°	138-0°	110-0°	113-0°	135-0°	138-0°	120-15°	125-10°
Radio-ulnar	Supination	0-90°	0-92°	0-20°	0-22°	0-90°	0-92°	0-70°	0-75°
	Pronation	0-88°	0-90°	0-30°	0-33°	0-88°	0-90°	0-60°	0-65°
Wrist	Flexion	0-90°	0-92°	0-70°	0-73°	0-90°	0-92°	0-80°	0-85°
	Extension	0-80°	0-85°	0-70°	0-73°	0-80°	0-85°	0-80°	0-85°
	Radial deviation	0-20°	0-22°	0-10°	0-12°	0-20°	0-22°	0-15°	0-18°
	Ulnar deviation	0-35°	0-38°	0-25°	0-27°	0-35°	0-38°	0-30°	0-35°

The muscle strength of shoulder was normal before and after the surgery. The positive findings of muscle strength are mentioned in the table below.

Table 5: Manual muscle strength assessment at baseline and discharge

Movements		Baseline		Discharge	
		Left	Right (within available range)	Left	Right
Elbow	Flexors	5	4	5	5
	Extensors	5	4	5	5
Radio-ulnar	Supinators	5	4	5	5
	Pronators	5	4	5	5
Wrist	Flexors	5	4	5	5
	Extensors	5	4	5	5
	Radial deviators	5	4	5	5
	Ulnar deviators	5	4	5	5

Therapeutic intervention:

The patient received 32 sessions of physiotherapy regularly for 16 days in the orthopedic inpatient ward by a physiotherapist specialized in musculoskeletal disorders. The goal of the session was to make the patient functionally independent. The physiotherapy rehabilitation program is mentioned in the following table (Table 6).

Table 6: Physiotherapy Rehabilitation Protocol

*BD= twice daily, TD= thrice daily

Rationale	Treatment	Week-wise dosage	
		1 st week	2 nd week
To improve patient awareness	Patient and his relatives were guided about the condition, its reoccurrence rates and significance of exercises.	Patient counseling was done in both the weeks.	
To relieve pain and muscle spasm	Cryotherapy	20 min- BD-TD	-
To prevent chest complications	Diaphragmatic breathing, Segmental breathing, Thoracic expansion exercises and spirometry	10 repetitions with 10 seconds hold- one set- BD	10 repetitions with 10 seconds hold- two sets- BD
To prevent fatigue	Jacobson's relaxation technique	Given at the end of each session.	
	Adequate pacing between all exercises	Focused throughout the exercise program.	
To maintain muscle strength	Isometric exercise for elbow flexors and extensors, wrist	10 repetitions with 10 seconds hold- one set-	10 repetitions with 10 seconds hold- two

	flexors, extensors, radial and ulnar deviators	BD	sets- BD
To improve ROM and muscle strength	Auto-assisted shoulder movements	10 repetitions- one set- BD	10 repetitions- two sets- BD
	Auto-assisted elbow, radio-ulnar and wrist movements	Under bandage	10 repetitions with - two sets- BD
	Hold and relax to improve elbow flexion and extension	Under bandage	5 repetitions- one set- BD
	Gripping exercises to improve all power and precision grips with hand and finger grip exercises, elastic bands, different sized balls, weighted peg board activities	10 repetitions with 10 seconds hold- one set- BD	10 repetitions with 10 seconds hold- two set- BD
	Hand-writing practice	-	1 page everyday

Discussion

This article discusses the physiotherapy rehabilitation of an eight year old female diagnosed with benign osteochondroma of right distal end radius which was surgically excised. The physiotherapy sessions aimed to prevent secondary complications, improve the range of motion, grip strength, muscle strength and motivate the patient to gain functional independence.

Osteochondroma is one of the frequently found benign bony neoplasm generally diagnosed in the early childhood and adolescence [13,14]. It is described as cartilage-capped exophytic outgrowths and can be either solitary or multiple, sessile or pedunculated [15]. In this patient also, multiple sessile exostosis was found involving distal end of right radius, distal end of proximal phalanx of left index finger, and distal end of fifth metatarsal of left foot. Surgical excision of tumor is the most common treatment of choice in patients with osteochondroma [16]. Similar treatment was also carried out for this patient.

Physiotherapy enhances the recovery by preventing secondary complications, and improving ROM, muscle strength, grip strength, and functional independence; hence, it must be incorporated after the surgical excision of osteochondroma [12]. Shruti Bhoge et al. studied the effect of physiotherapy in osteochondroma of 4th and 5th ribs and concluded that physiotherapy plays an important role in the maintenance of mobility and improvement of quality of life [10]. This study had also utilized a similar personalized physiotherapeutic approach which led to the improvement of range, muscle strength, grip strength and functional independence.

Conclusion

Physiotherapy has always been an important element to enhance the recovery after any surgery. Similarly even after the surgical treatment of osteochondroma, physiotherapy helps in maintaining mobility and improving the function and quality of life. Hence, the above study concludes that the inclusion of early

physiotherapeutic exercises personalized according to the needs of the patient helps to prevent the post-operative complications, improves range of motion, grip strength, muscle strength, function and thus hastens the recovery of the patient.

Conflicts of interest: None

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