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Original research article

Evaluation of radiological outcome of aneurysmal bone cyst with sclerotherapy with polidocanol

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Abstract

The standard treatment for aneurysmal bone cyst is bone curettage and grafting which was associated with high morbidity. Hence sclerotherapy came as alternative therapy, which minimally invasive hence came to popularity. This study aims to find out the radiological outcome of aneurysmal bone cyst with sclerotherapy with polidocanol.

Methods: 31 patients who were diagnosed with aneurysmal bone cyst underwent sclerotherapy with polidocanol with follow-up for 2 years. We assessed time to healing and recurrence, pain relief, and radiological outcome using modified Neer's criteria for the radiological healing of the bone cysts.

Result: At last follow-up, 100% had achieved complete healing. Complications were injection site necrosis, pain and hypopigmentation, all of which resolved spontaneously.

Conclusions: Sclerotherapy by using polidocanol is a safe treatment option which was effective, less cost expense, good cosmetics, reduced morbidity, can do as day care procedure. Local complications due to extravasation which will reduce spontaneously.

Keywords: Radiological, aneurysmal bone cyst, sclerotherapy, polidocanol

Introduction

An aneurysmal bone cyst (ABC) is a benign locally expansile lytic lesion of the bone. It contain of blood filled spaces separated by septae encompassing osteoid tissue and giant osteoclast cells [1]. This bony lesion most common site metaphysis of bone with common in second decade of age [2]. It can also develop secondary to other primary bone tumours, such as telangiectatic osteosarcomas, fibrous dysplasia giant cell tumours, hemangiomas, osteoblastomas, chondroblastomas and non-ossifying fibroma [3]. Secondary ABC is secondary blow out in a preexisting lesion. Presenting complaints of pain and swelling and rarely with a pathological fracture [4]. Radiologically characteristics expansile, lytic bone lesion of the metaphysis with thinning of cortex and subperiosteal new bone formation. In MRI shows Multiple fluid-fluid level and soft tissue expansion on MRI are diagnostic and solid soft tissue component within the lesion is suggestive of secondary ABC [5]. Biopsy is the gold standard investigation of choice. The bone cyst is curettage with bone grafting is the standard treatment and is associated with high morbidity and recurrence [6]. To reduce the rate of recurrence but with increased morbidity by using various adjuvant techniques such as high-speed burrs and cryotherapy. Hence minimal invasive methods such as sclerotherapy, radiotherapy, embolization are gaining more popularity now a days.

This study focuses on the comparing radiological and clinical outcome of the ABCs treated by polidocanol sclerotherapy based on the clinic radiological diagnosis. is used to assess the radiological outcome at regular intervals of healing bone assessed by Modified Neer's criteria for radiological healing of bone cysts [8].

Materials and Methods: From 2008 to 2018, 31 cases were diagnosed with ABCs. Among these, 31 cases were selected for sclerotherapy with polidocanol (ST), all cases diagnosed as primary ABC based on the clinico-radiological picture and treated since 2012 irrespective of the size and site of the lesion. followed up period minimum of 2 years. Preoperative evaluation done by plain radiography, MRI, CT scan. Secondary ABC excluded from the study. This study was done after getting the approval from Institutional Review board, ethical committee and informed consent from the participants.

Statistical Analysis Data collected was analysed by IBM SPSS (Statistical Package for Social sciences) Version 23.

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Operative technique of sclerotherapy: Local anaesthesia given (2%Xylocaine) taking care of aseptic precautions procedure were performed under CT guidance (Fig. 1). By core biopsy needle in all cases attempt to get sample of lining cells [9]. In classic ABC, usually blood was aspirated (Fig. 2a). For pathological examination about 10ml of blood aspirate along with lining tissue specimen if obtained in the core biopsy needle were send (Fig. 2b). By using 18G needle break the separate by moving around all directions. After injecting sclerosant sealed the area for 10 minutes (Fig. 2c). This preventing extravasation of the sclerosant is the crucial step in and prevent soft tissue necrosis. After CT scan the amount of sclerosant determined (1ml 3% polidocanol per 1cm3 of the lesion) and no more than 12ml(360mg) sclerosant was injected into any lesion. 3% polidocanol (hydroxypolyethoxydodecan) was used as the sclerosant available in 2ml ampoules; 1ml = 30mg polidocanol. Patients were follow-up during at 10 days following the first injection, followed by at 3months, 6months, 12 months and 24 months. By outpatient basis during the follow-up the radiological assessment of the lesion (cortical sclerosis, volume reduction, and cavity opacification) along with the clinical assessment of the symptoms of the patient were performed (Fig. 3, Fig. 4). Features suggestive of healing are resolution of pain on clinical examination and thickening of cortex on radiological examination without any increase in the cyst size. Second dose of the sclerosant was administered when features suggestive of healing absent. Modified Neer's criteria for the radiological healing of the bone cysts was used for radiological assessment (Table 1).

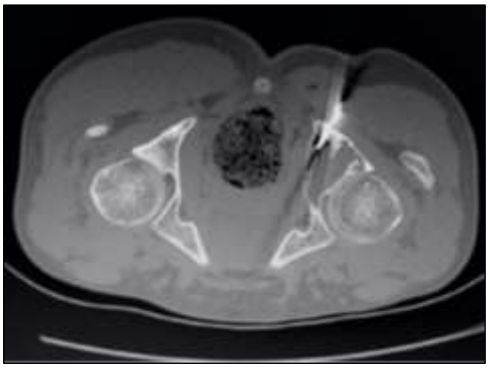

Fig 1

Fig 2: Bloody fluid aspirate (a), (b) and Injecting the sclerosant(c)

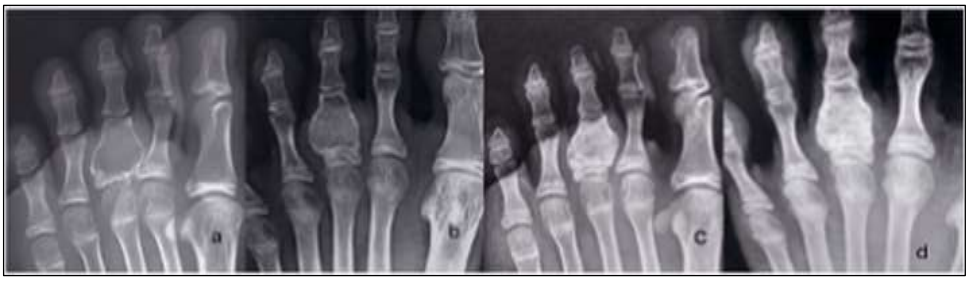

Fig 3: X-ray showing healing of proximal phalanx of 3rd toe at presentation (a), 3 months (b), 6 months (c) and 1 year (d)

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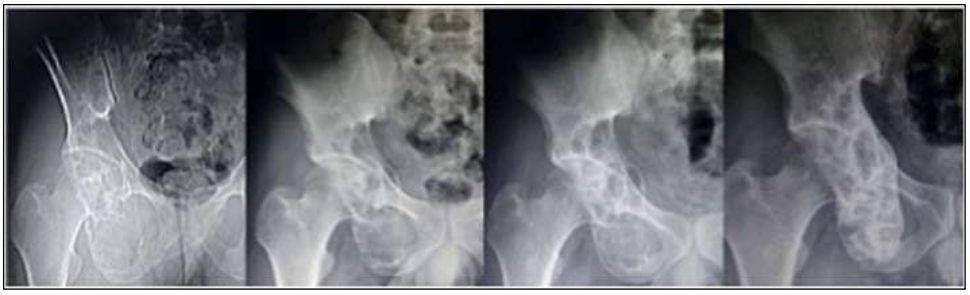

Fig 4: X ray showing healing of ischium at presentation (a), 3 months (b), 6 months (c) and 1 year (d)

Table 1

Grade 1	Healed cyst	Cyst filled with formation of new bone with or without small, static, radiolucent area(s) <1cm
Grade 2	Healing with defect	Static, radiolucent area(s), <50% of the diameter of the bone with enough cortical thickness
Grade 3	Persistent cyst	Radiolucent areas >50% of the diameter of the bone and with a thin cortical rim; no increase in cyst size;
Grade 4	Recurrent cyst	Cyst reappeared in a previously obliterated area or a residual radiolucent area has increased in size.

Table 3: Site Wise Distribution

Location	Frequency	Percent
Clavicle	2	4.2
Femur distal	9	18.8
Femur proximal	3	6.3
Femur shaft	1	2.1
Fibula	1	2.1
Humerus proximal	3	6.3
Humerus shaft	2	4.2
Ilium	2	4.2
Ischium	2	4.2
Metacarpal	2	4.2
Metatarsal	1	2.1
Phalanx foot	2	4.2
Phalanx hand	1	2.1
Radius distal	2	4.2
Sacrum	1	2.1
Scapula	1	2.1
Talus	2	4.2
Tibia distal	4	8.3
Tibia proximal	7	14.6
Total	48	100.0

Table 2

	Sclerotherapy
Number of Patients	31
Mean Age in Years	17.67
Gender (M: F)	18:13
Average No: of Treatments	1.06
Mean Treatment Duration	4 Months
Recurrence	0

Table 4: Preoperative Enneking stage

Enneking	Sclerotherapy
Latent	5
Active	17
Aggressive	9
Total	31

Pain and swelling were the chief complaints in majority of the patients with pain seen in all patients. No case presented with pathological fracture in our series.

Femur was the most commonly involved bone, accounting for 14 cases, followed by tibia (12 cases).

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Distal femur and proximal tibia accounted for commonest site single. Site wise distribution of primary ABC summarised in Table 3. Pre-operative Enneking scores of the lesions listed in Table 4.
Aspirated bloody fluid and cell block were sent for histopathology in all cases. Only in three cases we were able to obtain wall linings by curetting. In 28 cases, the report came to be consistent with ABC or smear with no atypia. Three cases were excluded from polidocanol as the histopathology reports turned out to be ABC secondary to GCT.
Mean duration for cortical healing was 4 months in the sclerotherapy therapy. Mean number of injection per patient was 1.09. Twenty eight patients were healed by a single dose of polidocanol and three patients required second injection.
The modified Neers' criteria (Table 1) were used to assess the radiological outcome at regular intervals of 3, 6, 9 and 12 months (Table 5). A the end of 24 months follow up there were 19 grade 1 and 12 grade 2.

Discussion

Various treatment options available for Aneurysmal bone cyst from extended curettage to minimally invasive sclerotherapy. Now sclerotherapy were widely practiced. Each treatment options had its own advantage and disadvantage. Current accepted treatment method was intralesional curettage with or without bone graft. But when lesion near to epiphyseal plate has high recurrence rate and growth disturbance. So to reduce the recurrence high speed burring and cryotherapy was used [12]. Complications were bleeding, physeal damage and incomplete tumor removal [13]. Other treatment modalities like intralesional cryotherapy, sclerotherapy, radiation therapy, selective embolization and extralesional en-block excision with or without reconstruction.
In case of primary ABC treated with sclerotherapy very promising result by activating virchows triad. Different sclerosant available for various disease like hypertonic saline, hypertonic dextrose, glycerine based sclerosants, alcohol [17]. Dubios *et al*. and Juhan *et al*. stating that absolute alcohol very effective in technically challenging and high-risk candidates [18, 19]. Now a days polidocanol considered as sclerosant for varicose vien, telangiectasis, venous malformations [21]. There will be immediate thrombosis with complete ossifications of lesions within 2 years of polidocanol use. When ABC like tumor procced with sclerotherapy along with needle biopsy. In our study 3 cases turned ABC secondary to GCT were excluded from study. MRI demonestate multiple fluid filled cystic lesion separate by a thin septum indicating collection of blood. Fluid greater than 2/3 level shows benign nature of lesion [20]. Area of solid within the lesion suspeson of secondary ABC and such cases confirmed by taking biopsy.
In our study, 31 patients were treated with polidocanol with follow-up for 2 years, shows 100% healing even in aggressive cases. Most of the patients had symptomatic relief within 6 week and cortical thicking on radiography by 4 months. These results were comparable with batisse *et al*. [20]. And the mean residual lesion was less than 25% from initial lesion. Mean injection required around 1.09 but mean injections of 3 required by study Rastogi *et al*. and brosjo *et al*. [7, 23].
There were no recurrence and malignancy transformation in patients treated with sclerotherapy. Also, this was cost effective, reduces biopsy attempts, avoids multiple fluoroscopy, better cosmetic and can perform as day care procedure. But complications associate with sclerotherapy were hyperpigmentation, injection site necrosis, hypopigmentation. But these complications were subsides spontaneously. Local complications controlled by preventing extravasation.

Table 5: Post-Op Neer Score

Post Op Neer Score	3 M	6 M	12 M	24 M
1	1	3	8	19
2	18	23	22	12
3	12	5	1	-
4	-	-	-	-
Fisher Extract P Value	0.64	0.961	0.471	0.255

Conclusion

Sclerotherapy by using polidocanol is a safe treatment option which was effective, less cost expense, good cosmetics, reduced morbidity, can do as day care procedure. Local complications due to extravasation which will reduce spontaneously.

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