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Injection polidocanol sclerotherapy for aneurysmal bone cyst: A study of 19 patients

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Abstract

Background & Objectives: The purpose of this study was to evaluate the clinical and functional outcomes of sclerotherapy for Aneurysmal bone cysts.

Methods: The study was carried out on 19 patients of Aneurysmal bone cysts treated in the Department of Orthopedics. Information on the patients was compiled from clinical details, case files and procedure records. This was a prospective study. Patient follow up was for a minimum of 6 months to a maximum of 24 months (2 years).

Results: Excellent or good pain relief and function were obtained in 19 patients after sclerotherapy.

Conclusion: Our study suggests that the sclerotherapy for Aneurysmal bone cysts can provide satisfactory clinical and radiographic outcomes after an intermediate duration of follow-up. The study was free of complications, the overall functional and clinical outcome showed excellent results.

Keywords: aneurysmal bone cysts (ABCs), polidocanol, sclerotherapy

Introduction

Aneurysmal bone cysts (ABCs) are relatively uncommon expansile lytic tumors diagnosed at adolescence with incidence of 1.3-1.5/100,000, constituting approximately 1% of all benign bone tumors^[1, 2]. The prevalence is equal among both male and female patients. It was first described by Jaffe and Lichtenstein^[3] in 1942. The origin of the lesion remains controversial. Typical features include cortical thin, lytic, expansile, eccentrically located lesion in the metaphysis and a subperiosteal thin shell of bone. There are 3 different clinical presentations, from the latent to the active form and rarely aggressive form. The aggressive form looks similar to telangiectatic osteosarcoma.

The treatment options are embolization, cryosurgery, curettage with bone grafting/ cementing, selective arterial embolization, radiotherapy, sclerotherapy etc. Surgical and adjuvant treatment have a high rate of complications. In recent years percutaneous polidocanol injection therapy has emerged as a safe and effective method of treatment for aneurysmal bone cyst and obviates the surgical complications^[4]. Polidocanol is used for varicose vein treatment since long time. Sclerosants act by damaging endothelium of vessels and starting a coagulation cascade that results in thrombosis.

The main objective of the present study was to assess the clinical and radiological outcome of sclerotherapy {using 3% polidocanol (Hydroxyl polyethoxy dodecane); [2 ml ampoules]; each millilitre contains 30 mg of polidocanol} in ABC. Secondary objectives were to assess clinical efficacy in terms of pain and to analyze recurrence and complications according to sclerosing agent.

Materials and Methods

A tertiary-center based prospective study covered 19 patients with primary ABC managed by sclerotherapy were included: 8 females, 11 males; mean age, 13 years (range:4–18 years). All presented active or aggressive ABS on the Capanna classification^[5]. Classical ABC on pathologic analysis were seen in 14 patients. Mean follow-up was 15.3 months (range: 6–24 months). Six had less than 1 year follow-up, including no patient lost to follow-up; only clinical efficacy and complications were studied in these cases.

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Preoperative imaging comprised plain radiographs and MRI and/or CT. A histological diagnosis was obtained using a percutaneous trephine biopsy. Treatment started three months after the biopsy. All cases of secondary aneurysmal bone

cysts were excluded from the study. Radiological follow-up comprised X-ray and MRI at 3 months, 6 months, and 1 and 2 years. Pain was assessed on VAS score.

The following data were systematically collected:

Patient	Gender	Age	Location	No. of injections	Post procedure VAS	Ossification	Complications
1	F	5	Humerus	1	0	Complete	-
2	F	12	Tibia	1	0	Complete	-
3	M	16	Humerus	2	0	Complete	-
4	M	17	Tibia	2	0	Partial	Pain
5	F	6	Humerus	1	0	Complete	-
6	M	11	Humerus	1	0	Complete	-
7	M	10	Metatarsal	1	3	Partial	-
8	F	8	Fibula	1	0	Complete	Local necrosis
9	M	13	Tibia	1	0	Partial	-
10	F	14	Calcaneus	1	0	Complete	-
11	F	9	Humerus	1	0	Complete	-
12	M	10	Metatarsal	1	0	Absent	-
13	F	12	Humerus	1	0	Complete	-
14	M	11	Fibula	1	0	Partial	-
15	F	9	Humerus	2	0	Complete	-
16	M	12	Tibia	1	0	Complete	-
17	M	7	Femur	1	0	Complete	Pain
18	M	13	Humerus	1	0	Complete	-
19	M	14	Humerus	2	0	Complete	-

Ossification on MRI was considered

Ossification	Residual cyst	Cortex	Fluid Levels
Complete	<20%	normal	Disappearance
Partial	<50%	Thickening	Reduced
Absent	No change	No change	No change

Procedure: It was performed under Short general anesthesia on simple table, supine position. Preoperative prophylactic antibiotics were given half an hour before injection. After painting draping done, Polidocanol was injected into the lesion under fluoroscopic guidance using a 18 G 1.5” needle. 1 ml of 3% polidocanol was injected in lesions < 1 cm³ size and 2 ml for lesions >1 cm³ volume of the lesion. No more than 2 injections were given to any patients.

Hospital stays were of 2-3 days. In case of non-ossification or persisting pain, reprocedure was suggested; interval between sclerotherapy injections was 4 weeks. Relatives and patient

were informed of the advantages and risks of the procedure, and written consent was obtained. Patients were advised to avoid contact sports and strenuous activity until the lesion healed.

The response of treatment, the occurrence of complications and a functional assessment were also recorded at each follow-up visit.

Statistical analysis: We used the chi square test and Student’s t -test to analyse our results. A p value < 0.05 was considered significant.



1 month after 1st injection

after 2nd dose

6 months

Results

In the group with up to 2 years' follow-up (n = 13), ossification was complete in 15 cases (78.94%) partial in 3 (15.78%) and absent in 1(5.26%) case. There were no recurrences. Pain resolved (VAS = 0) in 18 patients (94.7%) by 3 months after injection course. One patient had persistent pain (VAS = 3) after second injection. There were two cases of inflammatory reaction, both with spontaneous resolution: one cutaneous erythema, and one sub-cutaneous nodule at the injection site. One patient showed skin necrosis, which responded well to local treatment. There were no cases of infection or complex regional pain syndrome. Improvement in the functional score correlated positively with the reduction in size of the lesion. The functional score at the end of the final follow-up was significantly better than that at the end of the initial treatment. There was no correlation between the site treated and the length of treatment, indicating that the outcome is not influenced by the site of the lesion.

Discussion

The present study reveals novel minimally invasive treatment for ABC, with complete resolution in ~80% cases. Pain and difficulty in day-to-day activity (i.e., writing for upper limb and walking running etc for lower limb) were the constant presenting symptoms. Cortical irregularity of bone was present in many cases. Pain assessment by VAS score were

parameters to determine treatment efficacy.

There is still dilemma exists about origin of ABCs. Classically it has been considered as AV fistula/malformation in the bone but it may be *denovo*⁷ or posttraumatic^[6]. Success of treatment depends on obstructing vascularity by sclerosing agents^[8]. Apart from sclerotherapy, many treatment options are there - embolization, cryosurgery, curettage with bone grafting/ cementing, selective arterial embolization, radiotherapy etc.

Curettage with or without bone grafting is considered to be the treatment of choice for these lesions. However, there are chances of recurrence with curettage and bone grafting^[9] and potential danger is damage to the physal plate. All other invasive treatments are not practised much in view of complications.

Sclerosants are used for treatment of varicose veins and other vascular malformations. They act by activation of coagulation cascade, damage to endothelium of blood vessels and hence thrombotic occlusion of blood vessels. Polidocanol has been used safely for these purposes with fewer complications.

The result was satisfactory as ossification was complete in 15 cases (78.94%) partial in 3 (15.78%) and absent in 1(5.26%) case. These findings are similar to study by Marcove *et al.*^[10] who used curettage and cryotherapy and got value of 90% (63% to 100%). We gave maximum 2 injections to our patients. Clinical and radiological improvement continued after the completion of treatment suggesting an ongoing healing process. Only one patient did not show signs of calcifications who was successfully treated with curettage and bone grafting.

There were no major complications in our study. Two patients had complained of pain at local site and one patient had necrosis at local injection site. We had not encountered any major complications in our study.

There is potential scope of sclerotherapy treatment in cases of spine, pelvis or sacral area which are difficult to access by surgery due to very important structures surrounding.

Conclusion

Results of injection sclerotherapy are promising. Being minimally invasive procedure, it has less operative site morbidity or cosmetic problems. Sclerotherapy achieves quick resolutions of cyst without major complications. Patients and relative's acceptance of treatment is very good.

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