

Original Research Article

Role of selective intralesional embolization in vascular conditions of the nose and paranasal sinuses

Anil S. Harugop, Suhasini*, Shama Bellad, Navin Mulimani, Adarsh Sanikop, Jahnvi

Department of ENT and HNS, KAHER's Jawaharlal Nehru Medical College, Belagavi, Karnataka, India

Received: 10 April 2019

Revised: 06 July 2019

Accepted: 11 July 2019

*Correspondence:

Dr. Suhasini,

E-mail: suhasini0809@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Preoperative angiographic embolization of major feeding vessels is performed for vascular tumours and has become a valuable, even necessary tool in the surgical treatment of vascular lesions and is likely to improve the results of subsequent surgery.

Methods: We have treated six patients, all males, aged between 16-22 years. The patients were informed of the treatment strategy, and their interventions were carried out in accordance with local and general ethical standards and principles. All patients presented with nasal obstruction and epistaxis. Routine blood investigations were done and contrast enhanced CT was done to all patients to know the site of origin, size and extend of the tumour. Five patients were treated with preoperative embolization, whilst one underwent surgery without embolization.

Results: The outcome of the surgery in six patients were evaluated and interpreted. Patients who underwent sub selective embolization (SSE) had lowest morbidity and blood loss when compared to the one operated without embolization.

Conclusions: Embolization has a vital role to play in many aspects of otolaryngological practice. Using this safe technique of SSE, we achieved a significant shortening of time for surgical removal of the tumour as well as a reduction of total perioperative blood loss.

Keywords: Juvenile nasopharyngeal angiofibroma, Epistaxis, Sub selective embolization, PVA particles

INTRODUCTION

Therapeutic embolization was first used in the management of acute gastrointestinal bleeding in 1972, by Rosch et al and has since become established in the management of many clinical conditions.¹ Sokoloff et al first used embolization successfully for refractory epistaxis in 1974.² Preoperative angiographic embolization of major feeding vessels is performed for vascular tumours such as meningioma, haemangioblastoma, juvenile nasopharyngeal angio-fibroma, schwannoma and paraganglioma. It has become a valuable, even necessary tool in the surgical treatment of vascular lesions and is likely to improve the results of subsequent surgery.^{3,4}

Pre-operative trans-arterial embolization is usually performed 24-72 hours prior to surgery with PVA particles, sized to occlude the pathological circulation. Embolic agents can be categorized on various criteria. They are divided according to whether the resulting devascularisation is permanent or temporary. Temporary agents being autologous blood clot, gel foam powder and microfibrillar collagen, whilst polyvinyl alcohol particles (PVA) are considered permanent agents.⁵

The effect of PVA or gelatin particles on tissues is to cause an initial acute inflammatory response, which is followed by a chronic foreign body reaction within weeks. De-vascularization causes ischaemia and necrosis within hours, which in turn causes tumours to swell and

may exacerbate symptoms, particularly pain. Preoperative sub selective embolization is therefore, best performed the day before or immediately prior to operation.^{6,7}

The aim of the present study is to study the intra-lesional selective embolization and role of them in nose and paranasal sinuses to evaluate blood loss.

METHODS

Study design: Prospective study.

Study place and period

The study was conducted at Department of ENT and HNS, KAHER's Jawaharlal Nehru Medical College, Belagavi for one year (November 2017 to December 2018).

Materials and methods

We have treated six patients, all males, aged between 16-22 years. The patients were informed of the treatment strategy, and their interventions were carried out in accordance with local and general ethical standards and principles. All patients presented with nasal obstruction and epistaxis. Routine blood investigations were done and contrast enhanced CT was done to all patients to know the site of origin, size and extent of the tumour. Five patients were treated with preoperative embolization, whilst one underwent surgery without embolization. Post embolization patient was assessed based on duration of surgery, amount of blood loss and post embolization facial pain analysed using visual analogue scale.

Endovascular sub selective embolization

The interventions were performed with the patients under local anaesthesia. In all cases, a guide catheter was introduced via a sheath inserted into the right femoral artery.

A late parenchymal phase of the angiography of external carotid artery was used to obtain a roadmap in the sagittal

and coronal projection. The tumour was then embolised by slow injection of poly vinyl alcohol particles and gel foam particles (Table 1). Multiple branches of internal maxillary artery like middle meningeal artery, sphenopalatine artery and also direct branches from external carotid artery like ascending pharyngeal artery were embolised with particles ranging from 150 to 300 microns. The particles were deposited in the vessels within the tumour than in the proximal arteries. SSE's increased efficacy over conventional technique is in reducing the hypervascularity of the tumour which provides the surgeon, required clear intra operative field and ensures complete excision. This in turn leads to reduction in surgical duration, recurrence and patient morbidity.

Table 1: Embolization agents.

Agent	Embolization	Target vessels
Gel foam	Temporary	Large arteries
Poly vinyl alcohol	Permanent	Tumour vessels

RESULTS

In our study, all the six patients were males (100%) with the youngest patient being 16 years and the oldest being 22 years.

Out of the six patients, five patients underwent sub selective embolization whilst one did not. Patients who underwent sub selective embolization had lowest morbidity and blood loss was 100-450ml in the non-embolised patients and 800ml for the patient operated without embolization.

Post embolization, three patients (50%) had mild degree facial pain whereas the other two patients had moderate and severe degree respectively according to visual analogue scale. One patient who did not undergo embolization did not show any symptoms of facial pain, headache or facial numbness.

All had a histopathological diagnosis. Five patients had angiofibroma and one had adenoid cystic carcinoma.

Table 2: Demographic data and clinical findings.

S. no.	Demographic data			Clinical findings
	Age (in years)	Gender	Place	
1.	21	Male	Karnataka	Nasal obstruction, epistaxis
2.	16	Male	Maharashtra	Nasal obstruction, epistaxis
3.	22	Male	Karnataka	Nasal obstruction, epistaxis
4.	22	Male	Karnataka	Nasal obstruction, epistaxis
5.	22	Male	Karnataka	Nasal obstruction, epistaxis, right sided facial pain
6.	18	Male	Maharashtra	Nasal obstruction, epistaxis, headache

Table 3: The outcome of the surgery in six patients evaluated and interpreted.

	I	II	III	IV	V	VI
Approach	Endoscopic	Endoscopic	Endoscopic	Endoscopic	Endoscopic	Endoscopic
Embolization	SSE	-	SSE	SSE	SSE	SSE
Average blood loss	100 ml	800 ml	200 ml	350 ml	300 ml	450 ml
Duration of surgery	90 mins	3 hrs	90 mins	60 mins	70 mins	2 hrs
Duration of ICU care	0	36 hrs	0	0	0	0
Histopathology	Angio-fibroma	Angio-fibroma	Angiofibroma	Angiofibroma	Adenoid cystic carcinoma	Angiofibroma
Post emboliz-ation	Pain	Mild	NA	Moderate	Mild	Severe
	Headache	-	NA	-	-	Mild
	Facial Numbness	-	NA	-	-	Right facial numbness

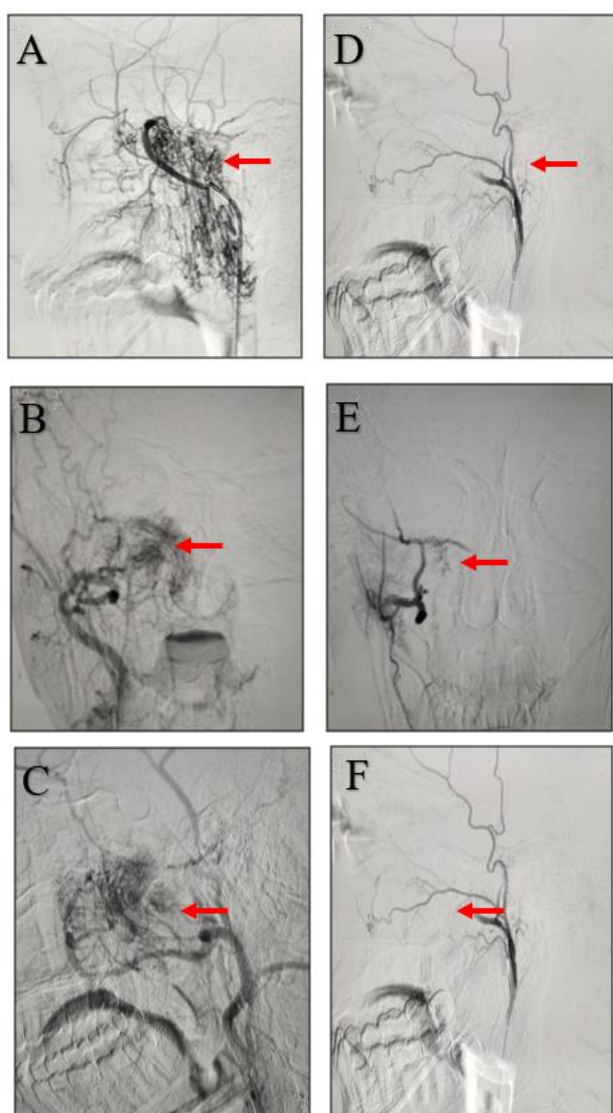


Figure 1: (A-C) Pre-embolization pictures showing tumour blush and contrast enhancement in feeding vessels; (D-F) Post-embolization pictures showing absence of blush in respective cases.



Figure 2: (A) Tumour mass excised completely from the nose and nasopharynx; (B) Tumour mass excised in toto from nasopharynx, pterygopalatine fossa and infratemporal fossa.

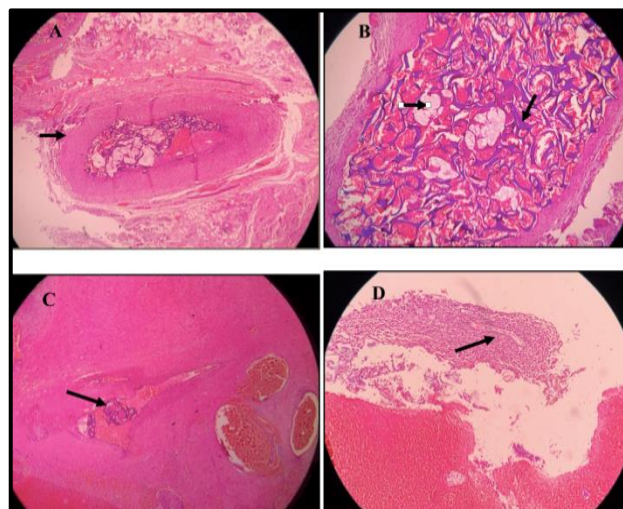


Figure 3: (A) 10X-cross section of a vessel showing intra-lesional (nasopharyngeal angiofibroma) embolic material; (B) 100X-embolic material in the vessel with white globules depicting gel foam surrounded by array of PVA particles (haematoxylin stain); (C, D) Intralésional view of gel foam in adenoid cystic carcinoma.

DISCUSSION

In our series there were six patients all of whom presented with h/o epistaxis and nasal blockage. On CT PNS patients had mass in the nasopharynx and nasal cavity. Paranasal sinus (sphenoid) involvement was also not uncommon. Extensions of tumours beyond pterygopalatine fossa and infratemporal fossa were also noted in one case. No patients had intra-orbital or intra-cranial involvement. The feeding vessels of the tumour in each case were noted in digital subtraction angiography and were subjected for embolization.

In all the cases in which embolization were performed, post SSE observation of any complication of this procedure was looked for, the worst of which is blindness or stroke. Incidence of complication was more as the stage of the mass advances. In our series no major complications occurred. Rates of stroke, TIA or blindness is reported in 0-2%, with Santaolalla et al reporting a 10.7% stroke rate in 28 patients.⁸ Angiography is a gold standard investigation which usually is essential in diagnosis. Furthermore, pre-operative embolization is considered mandatory for this procedure as it significantly reduces the bleeding during surgery. However, in our practice we did not perform the diagnostic angiography to avoid a repetition of angiography in a short span of time. We only advocate single angiogram together with sub selective embolization (SSE) 24 hours prior to surgery to reduce the risk involved (Figure 1).

The surgical technique of endoscopic excision of the masses were done in all cases (Figure 2) and was sent for histopathological examination where embolic materials were visualised in the intra-lesional vessel, which has been highlighted in our study and depicted in pictures (Figure 3). All patients were embolised by the same interventional radiologist and operated by the same surgeon. In our series, there is significantly low blood loss intraoperatively ranging from 100 to 450ml in embolised patients not requiring any blood transfusion and 800 ml in non-embolised patient requiring one unit of blood transfusion. Siniluoto et al in their study of ten patients, reported that embolization reduced the intraoperative blood loss at primary surgery from an average of 1510 ml in the non-embolised patients to 510 ml in the embolised patients.⁹ Regular follow-ups every two weeks for the first 6 months and every 6 weeks for one year was carried out. No suspected cases of residual tumour or recurrence is noted in any as of yet.

CONCLUSION

Using this safe technique of SSE we achieved a significant shortening of time for surgical removal of the

tumour as well as a reduction of total perioperative blood loss. Embolization has a vital role to play in many aspects of otolaryngological practice. It is desirable of SSE in future studies to further strengthen the findings of this study. Hence SSE demands expertise.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Rosch J, Dotter CT, Brown MJ. Selective arterial embolisation: a new method for control of acute gastrointestinal bleeding. *Radiol.* 1972;102(2):303-6.
2. Sokoloff J, Wickbom I, McDonald D, Brahme F, Goergen TG, Goldberger LE. Therapeutic percutaneous embolization in intractable epistaxis. *Radiol.* 1974;111(2):285-7.
3. Kingsley D, O'Connor AF. Embolization in otolaryngology. *J Laryngol Otol.* 1982;96(5):439-50.
4. Elden L, Montanera W, Terbrugge K, Willinsky R, Lasjaunias P, Charles D. Angiographic embolization for the treatment of epistaxis: a review of 108 cases. *Otolaryngol Head Neck Surg.* 1994;111:44-50.
5. Yiotakis I, Eleftheriadou A, Davilis D, Giotakis E, Ferekidou E, Korres S, et al. Juvenile nasopharyngeal angiofibroma stages I and II: a comparative study of surgical approaches. *Int J Pediatr Otorhinolaryngol.* 2008;72(6):793-800.
6. Fukutsuji K, Nishiike S, Aihara T, Uno M, Harada T, Gyoten M, et al. Superselective angiographic embolization for intractable epistaxis. *Acta Otolaryngol.* 2008;128(5):556-60.
7. Vidulich RA, Blanda MP, Gerson LW. Posterior epistaxis: clinical features and acute complications. *Ann Emerg Med.* 1995;25(5):592-6.
8. Santaolalla F, Araluce I, Zabala A, Lopez A, Garay M, Sanchez JM. Efficacy of selective percutaneous embolization for the treatment of intractable posterior epistaxis and juvenile nasopharyngeal angiofibroma (JNA). *Acta Otolaryngol* 2009;129(12):1456-62.
9. Siniluoto TM, Luotonen JP, Tikkakoski TA, Leinonen AS, Jokinen KE. Value of pre-operative embolization in surgery for nasopharyngeal angiofibroma. *J Laryngol Otol.* 1993;107(6):514-21.

Cite this article as: Harugop AS, Suhasini, Bellad S, Mulimani N, Sanikop A, Jahnnavi. Role of selective intralesional embolization in vascular conditions of the nose and paranasal sinuses. *Int J Otorhinolaryngol Head Neck Surg* 2019;5:1255-8.