The Egyptian Journal of Radiology and Nuclear Medicine xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

The Egyptian Journal of Radiology and Nuclear Medicine

journal homepage: www.sciencedirect.com/locate/ejrnm

Original Article

Preoperative embolization of nasopharyngeal angiofibromas: The role of direct percutaneous injection of cyanoacrylate glue in conjunction with particulate endovascular approach

Mohamed Abdel Hakim Osman Kasem [a,*], Ahmed Sayed Awad [a], Hussam Al Dein Mahmoud Al Bosraty [b], Ayman Ismail Kamel [a]

[a] Department of Diagnostic & Interventional Radiology, Cairo University, Egypt
[b] Department of Otolaryngology, Cairo University, Egypt

ARTICLE INFO

Article history:
Received 19 June 2016
Revised 15 August 2016
Accepted 1 September 2016
Available online xxxx

Keywords:
Nasopharyngeal angiofibromas
Direct percutaneous embolization
Cyanoacrylate glue

ABSTRACT

Purpose: The aim of this study was to assess the clinical application, extent of tumour devascularization and surgical outcome after embolization of nasopharyngeal angiofibromas prior to surgery by using percutaneous cyanoacrylate glue and endovascular particulate material. We discuss our primary experience, and describe technical considerations and potential complications of the procedure.

Subjects and methods: This study reports 29 patients with juvenile nasopharyngeal angiofibromas; that were embolized prior to surgical resection with percutaneous glue and endovascular particulate material; with surgery performed 24–72 h later. Preoperative and postoperative imaging studies were reviewed. Documented intraoperative blood loss was obtained and analysed.

Results: Almost complete radiographic devascularization was encountered in 26 of 29 tumours. An average of 3.2 spinal needles was placed in the tumours. An average of 4.2 mL of cyanoacrylate glue was injected into each tumour. The estimated mean of the blood transfused during the operations was 150 mL. The embolization procedure proved to be safe and effective with no major or serious complications.

Conclusion: The embolization of nasopharyngeal angiofibromas before surgery using percutaneous cyanoacrylate glue with endovascular particulate material proved to efficiently devascularize these tumours with lower blood loss during surgery and no major procedural complications.

1. Introduction

Nasopharyngeal angiofibromas are highly vascular benign tumours that occur exclusively in adolescent males and in most instances manifest with recurrent epistaxis [1].

They are centred on the sphenopalatine foramen and extend into the neighbouring structures causing bone erosive changes [2]. Several grading systems of nasopharyngeal angiofibromas are available with the Fisch grading system being the most common one used (Table 1).

Nasopharyngeal angiofibromas receive very rich blood supply mainly from the branches of the external carotid

Peer review under responsibility of The Egyptian Society of Radiology and Nuclear Medicine.

* Corresponding author.
E-mail address: mohdkasem85@gmail.com (M.A.H.O. Kasem).

http://dx.doi.org/10.1016/j.ejrnm.2016.09.001
0378-603X/

Table 1
Fisch classification for staging of juvenile nasopharyngeal angiofibromas.

Fisch classification	
Class I	Mass in nasopharynx and nasal cavity without bony disruption.
Class II	Invasion of maxillary, ethmoid, and sphenoid sinus.
Class III	Invasion of pterygo–palatine fossa, intratemporal fossa, orbit, and parasellar region.
Class IV	Invasion of cavernous sinus or optic chiasm or pituitary fossa.

artery on the same side. Large tumours receive arterial feeder from the internal carotid artery and from branches of the external carotid artery on the other side. This raises significantly the risk for massive blood loss during the surgical removal of such tumours. Therefore, endovascular embolization nowadays is very crucial and necessary to devascularize nasopharyngeal angiofibromas prior to surgical resection to minimize intraoperative bleeding and thus reduce morbidity and mortality rates [3].

Despite the widespread of endovascular embolization, great challenges are limiting this technique and preventing it from being effective in complete obliteration and devascularization of nasopharyngeal angiofibromas before surgery. The most encountered problems are technical and related to catheter navigation, arterial selection and particle injection. The interventionist might find it difficult to super select a small tortuous arterial feeder during the procedure; this may lead to arterial dissection or spasm and failure of arterial catheterization. The size of particles is also a crucial during embolization as large sized particles may clump and obstruct the catheter. In addition, the complex angioarchitecture of the tumour bed and the existence of dangerous intracranial anastomosis can cause distal migration of particles increasing the rate of stoke and neurological defects [4].

The increasing role of direct percutaneous injection of cyanoacrylate glue has become apparent as an effective and successful solution to overcome the aforementioned limitations of particulate endovascular embolization [5].

2. Subjects and methods

We obtained approval from the institutional ethical committee of our hospital for review and analysis of the medical and imaging records of 29 patients with pathologically proven juvenile nasopharyngeal angiofibromas, who we performed preoperative combined percutaneous and endovascular embolization between May 2013 and April 2015. The procedures were carried out using a Siemens Axiom Artis monoplane, Germany.

Preoperative multislice post contrast CT and MRI scans were obtained to precisely assess the location, size, and thus classification of juvenile nasopharyngeal angiofibromas. The following protocols were used: multislice post contrast CT scans of the nasopharynx in soft tissue and bone windows with multiplanar reformatting and MRI scans of the nasopharynx in pre and post contrast T1WIs and T2WIs sequences taken in axial, coronal and sagittal planes.

Pre procedure assessment of the general clinical condition of patients and an informed consent were taken acknowledging that the interventionist and anaesthetist had explained the procedure and the possible risks and complications from the proposed procedure and general anaesthesia. The risks and complications of the procedure include minor pain, bruising and/or infection at the puncture site. Post embolization syndrome was damage to surrounding structures such as nerves, blood vessels and muscles. The blockage of nontarget arteries results in potential irreversible damage to other organs and tissue.

All patients are subject to general anaesthesia during the procedure. Diagnostic cerebral angiography (four vessels angiography) was performed with selective catheterization of the internal and external carotid arteries on both sides using a diagnostic catheter (braided Berenstein or Headhunter 5 F) over a guidewire (Terumo Glidewire® hydrophilic coated 0.035″). The system had to be continuously flushed with saline, and road-map technique was performed, to visualize the feeding vessel to be catheterized.

The results of the diagnostic angiogram were used to assess the feasibility of endovascular or direct percutaneous embolization, to establish the arterial blood supply to the tumour and to evaluate for dangerous collaterals to the intracranial circulation. The most common pathways of external to internal carotid anastomoses are in the orbital region via the ophthalmic artery that is the interface between the internal maxillary and internal carotid territories: the petrous-cavernous region via the inferolateral trunk, the petrous branches of the internal carotid artery, and the meningohypophyseal trunk to the external carotid artery; the upper cervical region via the ascending pharyngeal, the occipital, and the ascending and deep cervical arteries to the vertebral artery.

Microcatheter was then introduced into the guiding catheter with a coaxial microcatheter technique. The microcatheter used was (Renegade Boston Scientific); superselective micro-catheterization of the feeding artery was performed, until reaching the most distal point of the feeding artery to avoid reflux of the embolizing material. The most common encountered feeding artery was the internal maxillary artery and its branches namely the sphenopalatine and descending palatine arteries.

We start by using small sized particles (150–250 μm) in diameter to allow distal embolization, homogenous penetration and obliteration of the fine arterioles and venules within tumour vascular bed. When we start encountering stagnation of flow and reflux we shift to larger particles to occlude the feeders using larger sized particles (250–355 μm) in diameter. Sometimes if the tumour bed is so large or if there is a dangerous intracranial anastomosis/-collateral we start by using large sized particles (355–500 μm) in diameter to facilitate faster tumour bed occlusion and avoid the potential risk of inadvertent intracranial reflux of embolizing material.

In all instances residual tumoural blush is encountered being supplied by arterial feeders that cannot be catheterized due to their narrow calibre or tortuous course or due to the presence of hazardous intracranial anastomoses that make it very risky to embolize as it may result in distal migration of the particles causing stoke. In many cases a small deep component of the tumour is supplied by the ipsilateral internal carotid artery and cannot be targeted

Please cite this article in press as: Kasem MAHO et al. Preoperative embolization of nasopharyngeal angiofibromas: The role of direct percutaneous injection of cyanoacrylate glue in conjunction with particulate endovascular approach. Egypt J Radiol Nucl Med (2016), http://dx.doi.org/10.1016/j.ejrnm.2016.09.001