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Identifying feeding artery during preoperative embolization of juvenile nasopharyngeal angiofibroma

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Abstract

Treatment of choice and standard of care is surgical resection of the tumor. Nasopharyngeal angiofibromas receive an abundant blood supply mainly from the external carotid branches and partly from the internal carotid artery branches. Many patients are treated with preoperative embolization to minimize the risk of intraoperative hemorrhage and related complications. This retrospective study, we obtained analysis of the medical and imaging records of 11 patients with pathologically proven juvenile nasopharyngeal angiofibroma. Who we performed preoperative endovascular embolization between January 2019 until Desember 2021 in Wahidin Sudirohusodo Hospital, Makassar, Indonesia. The procedure was carried out using a cathlab monoplane Philips. A total 11 patients (only 1 female) with juvenile nasopharynx angiofibroma underwent endovascular embolization from 2019-2021 in Wahidin Sudirohusodo Hospital Makassar. Arteriography examination in patients with angiofibroma tumors revealed that the feeding arteries originate from the internal maxillary artery, ascending pharyngeal artery, facial artery, middle meningeal artery and branches of the internal carotid artery. Identifying the feeding artery before embolization is very important to facilitate the embolization process

Keywords: Angiofibroma; Embolization; Angiography; Juvenile nasopharyngeal angiofibroma

1. Introduction

Juvenile nasopharyngeal angiofibroma (JNA) is a benign tumor, but very aggressive to destroy the nasopharynx and its surroundings. These tumors occur at a young age and are highly vascular so they bleed easily and can cause serious conditions [1]. The etiology of JNA is not known for certain, but theories suggest that it is hormonal and genetic. A definite understanding of the pathogenesis of JNA is still very difficult to reach and the prognosis for the best long-term management of these patients is still very limited [2].

Treatment of choice and standard of care is surgical resection of the tumor. Nasopharyngeal angiofibromas receive an abundant blood supply mainly from the external carotid branches and partly from the internal carotid artery branches. Many patients are treated with preoperative embolization to minimize the risk of intraoperative hemorrhage and related complications [3].

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2. Subject and methods

This descriptive analytics study, we obtained analysis of the medical and imaging records of 11 patients with pathologically proven juvenile nasopharyngeal angiofibroma. Who we performed preoperative endovascular embolization between January 2019 until December 2021 in Wahid in Sudirohusodo Hospital, Makassar, Indonesia. The procedure was carried out using a Cath lab monoplane Philips.

Embolization was performed by one neurointerventional neurologist with experience 10 years and also a fellow's resident. The details of the procedure were written in the embolization report to hospital. Diagnostic angiography start with femoral artery access, digital subtraction angiography is performed with a 5 F catheter of the common, internal, and external carotid arteries. All embolizations were performed under general anesthesia. Embolization materials include Bead-block 100–300-micron, Contour 300–500-micron PVA Embolization Particles or Onyx™ liquid embolic system (LES). Embolization perform two-three days before resection tumor resection was performed by a skilled otolaryngologists.

3. Results

A total 11 patients (only 1 female) with juvenile nasopharynx angiofibroma underwent endovascular embolization from 2019-2021 in Wahidin Sudirohusodo Hospital Makassar.

Table 1 Data patient and angiography finging

Patients (age/sex)	Artery
18/M	Left internal maxillary artery branches
13/M	Both internal maxillary artery branches, both ascending pharyngeal artery
7/M	Both internal maxillary artery branches, both ascending pharyngeal artery
17/M	Right internal maxillary artery branches, right fascial artery
15/M	Left internal maxillary artery branches
15/M	Left internal maxillary artery branches
15/F	Right internal maxillary artery branches, right fascial artery and branches of the internal carotid artery (inferolateral trunk).
14/M	Both internal maxillary artery branches, both ascending pharyngeal artery, both meningeal media artery branches and branches of the internal carotid artery (right inferolateral trunk).
19/M	Left internal maxillary artery branches, left ascending pharyngeal artery
21/M	Both internal maxillary artery branches, both ascending pharyngeal artery
17/M	Left internal maxillary artery branches, left ascending pharyngeal artery

Arteriography examination in patients with angiofibroma tumors revealed that the feeding arteries originate from the internal maxillary artery, ascending pharyngeal artery, fascial artery, middle meningeal artery and branches of the internal carotid artery. There may still be some small branches from other arteries but those that are mentioned are major arteries and which can be embolized.

From that table showing the percentage of feeding arteries in the study population it can be seen that the internal maxillary artery is the main vascular source of angiofibroma tumors (100%) from all the arteries involved. While the rest get vascularization from more than one artery, the most of which are the internal maxillary artery and the ascending pharyngeal artery (27%). By knowing the possibility of feeding arteries from angiofibroma tumors, we can prepare equipment and skills so can anticipate complications before performing tumor embolization.

Wahid in Sudirohusodo Hospital, Makassar, is a referral hospital for eastern Indonesia, so angiofibroma tumor embolization always do in every year. Although the number of patients is not large, this information is important to demonstrate the application of tumor embolization in accordance with existing clinical guidelines in our hospital.

4. Discussion

Nasopharyngeal angiofibromas are most common in adolescent males, this result is similar to the study conducted that 10 out of 11 patients were male. From epidemiology study angiofibroma nasopharyng accounting for about 0.05 to 0.5% of head and neck tumors, and the reported incidence ranges from 1 in 150,000 to 1 in 1,500,000 [4].

Juvenile nasopharyngeal angiofibroma is a vascular tumor that typically receives blood supply via the external carotid artery. Our findings offer a more detailed assessment what arteries was involved to angiofibroma tumour. Angiogram from this patient with a JNA demonstrating supplies by internal maxillary artery. The maxillary artery provides many branches which supply structures within the face and cranium, one of the pterygopalatine branches of the maxillary artery that gives rise to multiple branches in JNA tumors (figure 1).



Figure 1 Angiogram from JNA patient, showed that the image was the main feeding artery of the tumor

This result similar with other research from Wu et al, the vascular supply to JNAs is primarily from distal internal maxillary artery branches, particularly the sphenopalatine, descending palatine and posterior superior alveolar branches [5]. In this study, some tumors were vascularized from the internal carotid artery which was difficult to embolize because the branching was very small and could cause complications. Bilateral vascularization of the tumor may occur, especially in large tumors that cross the midline [6].

This tumor in early stage usually vascularizes from a single branch of the ipsilateral ECA, most commonly the internal maxillary, ascending pharyngeal, sphenopalatine, and descending palatine arteries, which can be easily embolized. In addition, in advanced tumor development, it receives vascularization from several branches of the ipsilateral and contralateral ECA and from the ICA, most commonly via the vidian artery, the ophthalmic artery, and the inferolateral and meningohipophyseal trunks. The arterial supply of the ICA is present in 30% of cases when the tumor extends to the area of the sphenoid sinus, Para pharyngeal space, orbit, or intracranial cavity [7].

Surgical resection of nasopharyngeal angiofibroma is currently the first choice of therapy. There are several methods performed by endoscopically or externally approach that have become the main choice. However, due to the very high risk of bleeding, vascular embolization is very helpful in minimizing complications. Other treatment modalities that can be done such as radiation and cryotherapy [8]. Pre-operative embolization of juvenile nasopharyngeal angiofibromas can reduce intraoperative blood loss while lessening the risk of massive hemorrhage, shortening operation times, increasing intra-operative visibility, and allowing for easier resection of lesions. Furthermore, the diagnostic angiogram itself may be a valuable predictor of expected intraoperative blood loss [9].

Same result from other previous research Amran & Ashari, embolization of nasopharyngeal angiofibroma before resection is very useful to reduce perioperative complications of surgery. This procedure can reduce blood loss during tumor resection and provide better results [10]. Tumor staging and intraoperative bleeding are risk factors for residual juvenile nasopharyngeal angiofibroma [11].

5. Conclusion

Knowing the identification of blood vessels supplying the juvenile nasopharyngeal angiofibroma tumor prior to embolization is very important to make it easier to work and minimize the risk of embolization, so as to maximize the surgical area of tumor resection and reduce loss of bleeding.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors declare no conflict of interest.

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