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“Endoscopic Management of Advanced Juvenile Nasopharyngeal Angiofibroma with Extensive Infratemporal Fossa Extension: Surgical Challenges and Technical Modifications”- Case report

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Case Report

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Abstract

Background: Juvenile nasopharyngeal angiofibroma (JNA) is a rare, benign yet locally invasive vascular tumour affecting adolescent males. Advanced tumours extending into the infratemporal fossa (ITF) pose significant surgical challenges.

Case Report: An 11-year-old boy presented with a one-year history of progressive left-sided proptosis and a two-month history of left cheek swelling. Imaging revealed a highly vascular mass centred in the left sphenopalatine fossa, extending into the infratemporal fossa, orbit, nasopharynx, cavernous sinus, and extradural temporal lobe. Preoperative embolisation was performed to reduce intraoperative blood loss. The tumour was completely excised via a transnasal endoscopic approach with few modifications. The postoperative course was uneventful, and follow-up imaging at two months demonstrated no residual disease. Histopathology confirmed JNA.

Conclusion: This case demonstrates that exclusive endoscopic transnasal excision, combined with preoperative embolisation, can achieve complete resection of advanced JNA with extensive ITF extension, avoiding morbid open approaches.

Introduction

Juvenile nasopharyngeal angiofibroma (JNA) is a rare, benign yet locally aggressive vascular tumour occurring almost exclusively in adolescent males, accounting for approximately 0.05–0.5% of head and neck neoplasms. Originating from the pterygoid wedge, near the sphenopalatine foramen, it extends into adjacent spaces through preformed foramina. Management is challenging due to its high vascularity, local invasiveness, and risk of significant intraoperative bleeding. Preoperative CT, MRI, and angiography are essential for assessing tumour extent and vascular supply, while embolisation helps minimise intraoperative blood loss. However, the role of purely transnasal endoscopic approaches in achieving complete resection of tumours with extensive infratemporal fossa (ITF) involvement remains under evaluation, with limited data on outcomes(1).

This case report highlights the surgical challenges and endoscopic modifications used in managing a JNA with extensive ITF extension.

Case Report

An 11-year-old boy with no significant past medical, family, or psychological history presented with progressive left eye proptosis for one year and left cheek swelling for two months with no associated nasal, ear, visual, or systemic complaints. Clinical examination revealed left eye proptosis with preserved extraocular movements and vision, along with diffuse swelling of the left cheek. Nasal endoscopy demonstrated a vascular mass in the left nasal cavity extending into the nasopharynx.

CECT with carotid angiography revealed a well-defined, intensely enhancing soft-tissue mass (~ 5.1 × 5.5 × 5.7 cm) centred in the left sphenopalatine fossa, extending into the infratemporal fossa, orbit, paranasal sinuses, nasopharynx, parapharyngeal space, and intracranially into the cavernous sinus and extradural temporal lobe, with feeders from branches of the left ICA (Fig. 1).

[Insert Fig. 1 here]

MRI showed a T2/STIR hyperintense and T1 hypointense lesion, consistent with a vascular tumour. A diagnosis of juvenile nasopharyngeal angiofibroma (Radkowski stage III-B) was established. Differential diagnoses of sinonasal hemangioma, sinonasal hemangiopericytoma, nasopharyngeal lymphatic malformation, rhabdomyosarcoma, and sinonasal lymphoma were considered. Preoperative digital subtraction angiography followed by embolisation of the feeding vessels was performed with 350–550 µm PVA particles and Gelfoam. The angiographic appearance before and after embolisation is shown in Figs. 2A and 2B.

[Insert Figs. 2A and 2B here]

Figure 2B. Post-embolisation angiography following embolisation of the feeding vessels.

The patient's family reported no specific financial, linguistic, cultural, or healthcare-access barriers affecting the diagnostic process. However, the absence of typical symptoms such as epistaxis and nasal obstruction, despite extensive disease, posed a diagnostic challenge. The diagnosis was established using endoscopy, CT angiography, and MRI; biopsy was avoided because of the risk of severe haemorrhage.

After obtaining informed consent from the patient's parents, the tumour was excised endoscopically with minor modifications. Intraoperatively, a vascular mass extending from the left nasal cavity into the infratemporal fossa, orbital apex, sphenoid sinus, and cavernous sinus was identified. The tumour was adjacent to the Internal Carotid Artery but did not infiltrate it. Therefore, it could be safely removed without damaging the vessel. To improve access to the lateral extent, an alar groove incision was made, allowing better instrument manoeuvrability and complete resection. The tumour was delineated, and complete resection was achieved. Postoperative imaging obtained at the 2-month follow-up demonstrated no residual disease (Fig. 3).

[Insert Fig. 3 here]

Postoperatively, the patient had an uneventful recovery, with no evidence of residual or recurrent disease on follow-up imaging. At two months, he remained asymptomatic. The alar groove scar was well healed. Histopathological examination confirmed the diagnosis of juvenile nasopharyngeal angiofibroma. The excised tumour specimen is shown in Fig. 4.

[Insert Fig. 4 here]

[Insert Table 1 here]

Table 1
Timeline of clinical presentation, investigations, treatment, and follow-up

Time point	Clinical events, investigations, and management
1 year before presentation	The patient developed progressive left-eye proptosis.
2 months before presentation	Progressive swelling of the left cheek was noted.
At presentation	Examination revealed left-eye proptosis with preserved vision and extraocular movements, along with diffuse left-cheek swelling. Nasal endoscopy demonstrated a vascular mass occupying the left nasal cavity and extending into the nasopharynx.
Initial imaging	Contrast-enhanced computed tomography with carotid angiography was performed to assess the tumour extent, vascularity, and arterial supply. The findings were suggestive of an advanced juvenile nasopharyngeal angiofibroma.
Subsequent imaging	Magnetic resonance imaging of the face and neck corroborated the CT findings and further delineated the tumour's soft-tissue and intracranial extension.
1 day before surgery	Preoperative angiography and selective embolisation of the accessible tumour-feeding vessels were performed.
Day of surgery	The tumour was completely excised through a transnasal endoscopic modified Denker's approach, including the extradural intracranial component.
Postoperative period	The patient had an uneventful postoperative recovery without new neurological, ophthalmological, or major surgical complications. Histopathological examination confirmed juvenile nasopharyngeal angiofibroma.
2 months after surgery	Clinical evaluation and postoperative contrast-enhanced CT demonstrated no evidence of residual or recurrent disease.

Discussion

Juvenile nasopharyngeal angiofibroma (JNA) is a benign but locally aggressive vascular tumour of adolescent males, classically arising from the pterygoid wedge and near the sphenopalatine foramen and spreading into the adjacent structures through preformed foramina. Advances in endoscopic skull base surgery and preoperative embolisation have shifted management from traditional open transfacial and infratemporal approaches toward minimally invasive endoscopic techniques, even for advanced tumours.(2).

This case involves an advanced JNA originating from the left sphenopalatine fossa with extensive spread to the ITF, orbit, paranasal sinuses, parapharyngeal space, nasopharynx, cavernous sinus, and extradural temporal lobe. While traditional open approaches (subtemporal–preauricular, facial translocation, midfacial degloving) provide wide exposure, they are associated with high morbidity.

Recent evidence shows that well-planned endoscopic endonasal resection with preoperative embolisation can provide similar oncologic control with lower morbidity in selected patients(3).

Preoperative embolisation is standard for most JNAs, as it reduces intraoperative blood loss, enhances endoscopic visualisation, and enables safer dissection near critical neurovascular structures.

Endoscopic ITF management requires an expanded corridor for medial/lateral tumour control while sparing the infraorbital nerve, internal maxillary artery, and mandibular nerve branches. Key steps include wide middle meatal antrostomy, removal of anterior/medial maxillary walls, complete sphenoidotomy, posterior septectomy, and drilling of the posterior maxillary wall/pterygoid wedge to access the pterygopalatine fossa and medial ITF. These techniques enable successful resection of JNAs with pterygopalatine, ITF extension, with low recurrence rates.(4).

However, access to the far lateral and inferior ITF—particularly where the tumour abuts the mandibular ramus and lateral pterygoid musculature—may remain limited via a purely intranasal route. To overcome this, several authors have proposed “extended” or “hybrid” endoscopic approaches, such as the endoscopic modified Denker’s approach, which removes the anterior maxillary wall to create a wide trans-antral corridor to the pterygopalatine fossa and ITF, achieving good control of advanced lesions with acceptable cosmetic results. These techniques preserve the advantages of endoscopy while improving lateral reach and instrument manoeuvrability.(5)

In this case, a minor but effective modification—a small alar groove incision—was added to the otherwise endoscopic approach to enhance access to the lateral ITF. The incision, placed in the natural alar–facial crease, provides an inconspicuous scar with excellent cosmetic acceptability. It can increase the arc of rotation of the endoscope and instruments to gain better lateral access and avoid the need for a posterior septectomy in cases using the four-hand technique. Thus, a corridor connecting the maxillary sinus and the ITF was created, improving the angle of attack and allowing safe mobilisation of the tumour’s lateral extent without resorting to more morbid transfacial or preauricular–subtemporal approaches. The main tumour bulk was addressed through standard endoscopic steps (inferior turbinectomy, wide antrostomy, and drilling of the anterior, medial, and posterior maxillary walls), with the alar groove incision specifically facilitating lateral dissection and complete resection.

The patient’s smooth recovery—without neurological/cosmetic deficits or residual/recurrent disease on early imaging/endoscopy—aligns with reports favouring endoscopic management of complex JNAs using meticulous technique and adequate corridors. This case provides evidence that limited external aids, such as an alar groove incision, safely extend endoscopic reach for extensive ITF JNAs, balancing minimal invasiveness with adequate exposure.

Conclusion

This case shows that extensive JNA with extensive ITF involvement can be safely and completely resected via a predominantly endoscopic transnasal approach, aided by preoperative

planning/embolisation. Despite features favouring open surgery, expanded endoscopic corridors plus a small alar groove incision enabled full macroscopic resection, excellent cosmetic/functional outcomes, and no early recurrence. It supports tailored endoscopic techniques with minimal external modifications, expanding minimally invasive indications for ITF JNA.

Declarations

Consent for publication

Written informed consent was obtained from the patient's parents for publication of this case report and the accompanying clinical and radiological images. The patient's identity has been protected.

Competing interests

The authors declare that they have no competing interests.

Author Contribution

B. did the primary surgeryA.C. assisted in the surgery A. wrote the manuscript and prepared the figures 1-4D. helped write the manuscriptAll authors reviewed the manuscript

Acknowledgement

The authors thank the patient and his parents for providing consent to publish this case report. The authors also acknowledge the clinical, radiological, interventional radiology, anaesthesia, pathology, and nursing teams involved in the patient's care.

Availability of data and materials

The data supporting the findings of this case report are available from the corresponding author upon reasonable request. The data are not publicly available to protect the patient's privacy and confidentiality.

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Figures

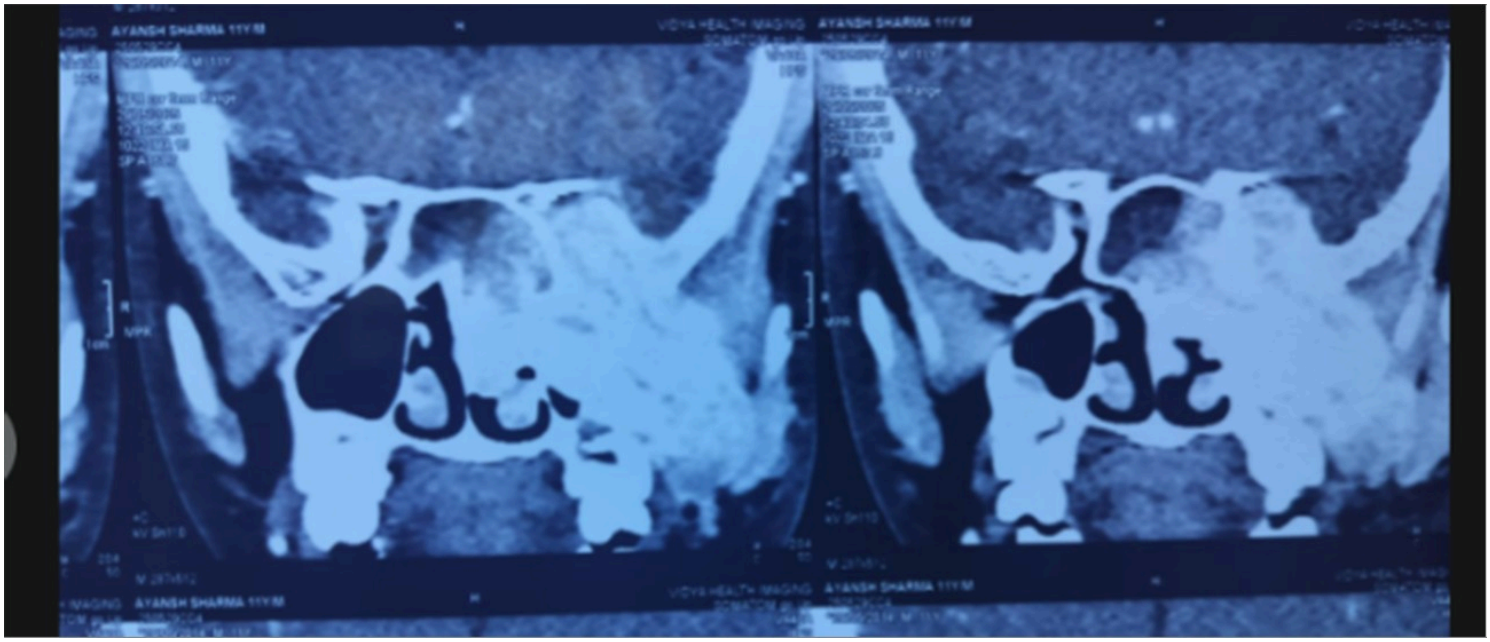

Figure 1

Preoperative coronal contrast-enhanced CT scan demonstrating extensive infratemporal fossa extension with cavernous sinus involvement.

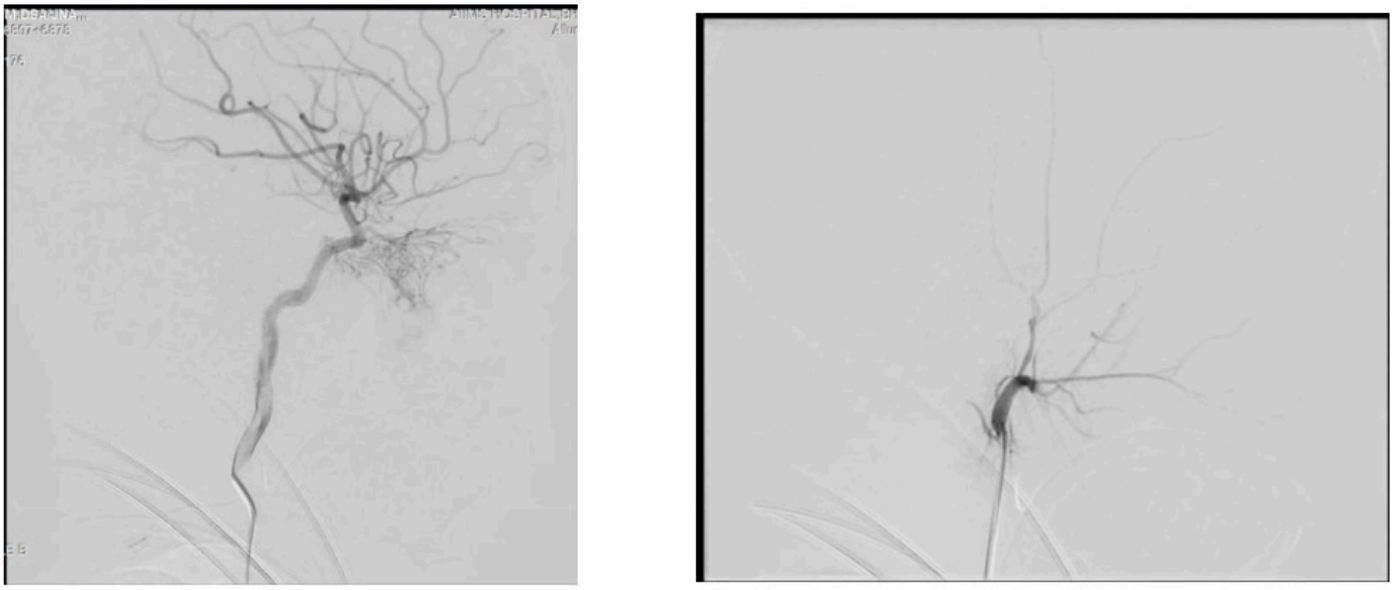

Figure 2

A. Pre-embolisation digital subtraction angiography.
Figure 2B. Post-embolisation angiography following embolisation of the feeding vessels.

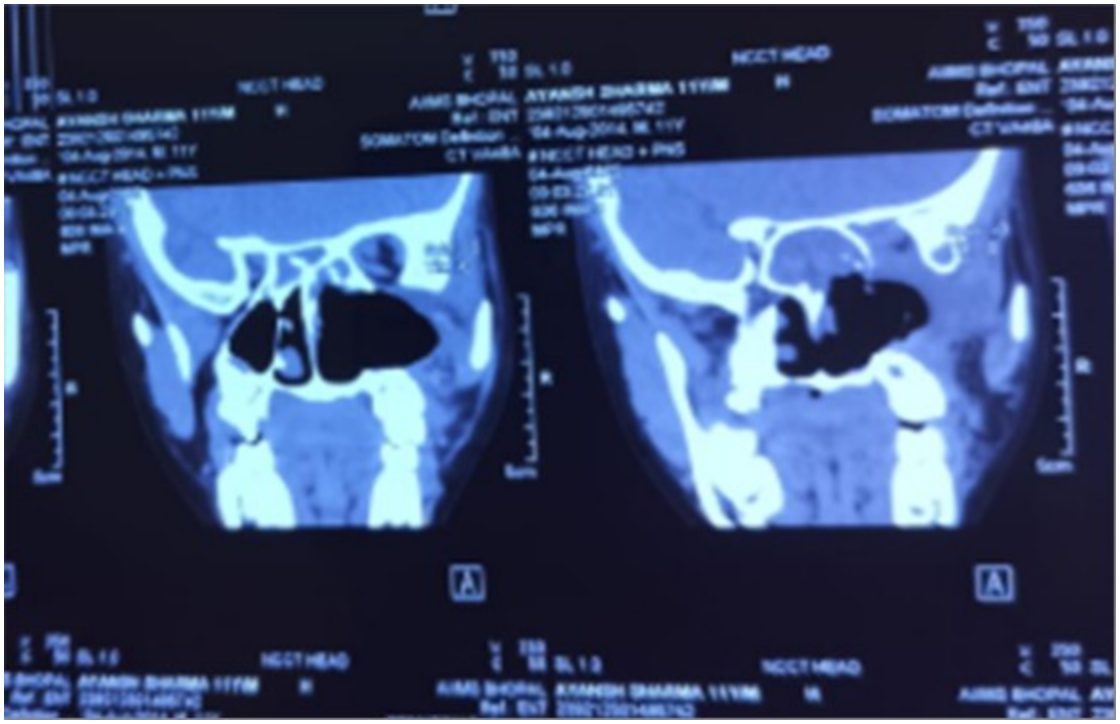

Figure 3

Contrast-enhanced CT scan obtained two months after surgery demonstrating complete tumour excision with no residual disease.

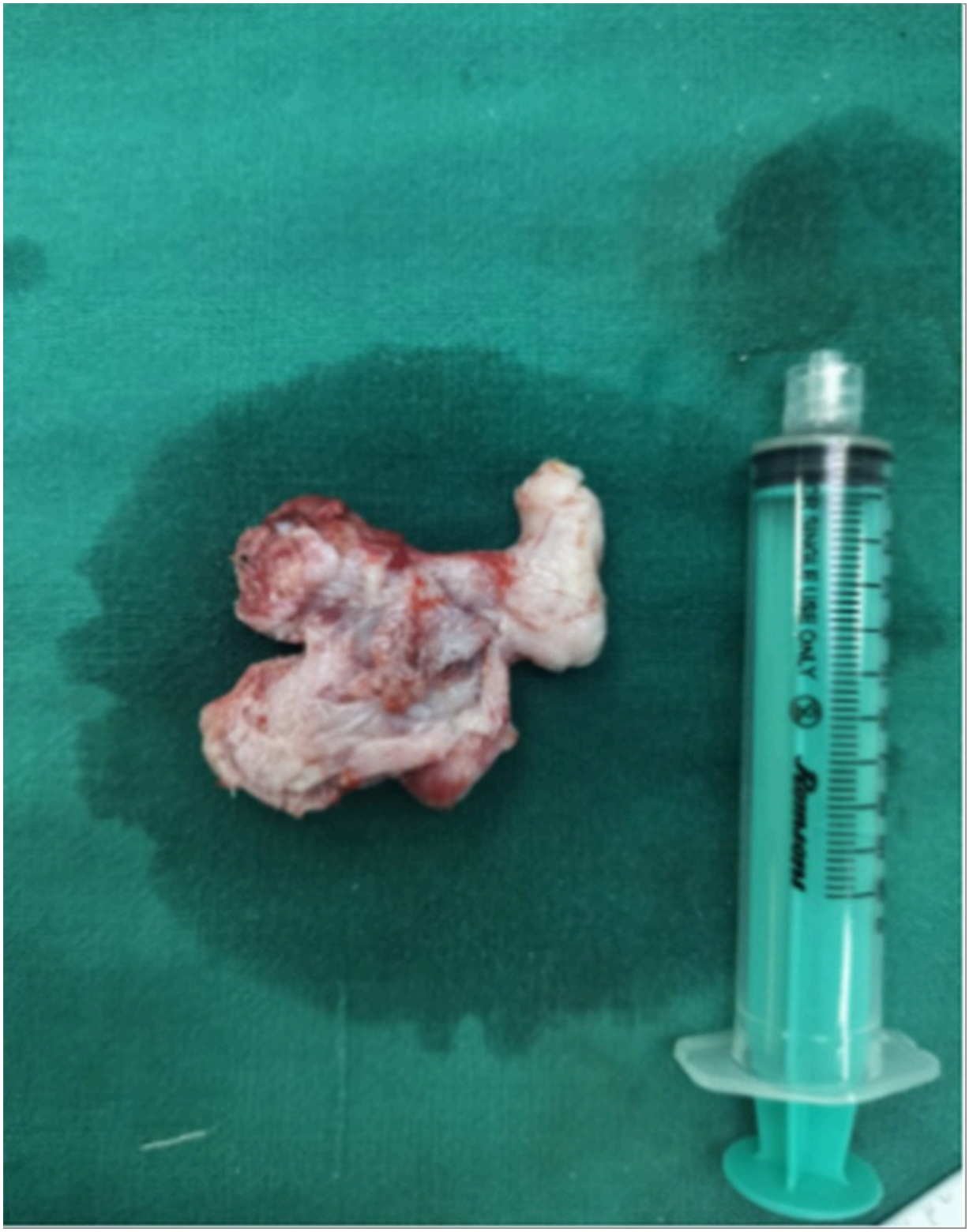

Figure 4

Gross specimen following complete endoscopic tumour excision.

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