Case Report

Endoscopy-assisted extraction of penetrating a wayer arrow in the ethmoid sinus

Christin Rony Nayoan*, Christian Lopo **, Wigia Hanalia Lopo, Rahma***, I Putu Fery Imanuel White******

**Department of Otorhinolaryngology Head and Neck Surgery,
Faculty of Medicine, Tadulako University, Palu
**Undata General Hospital, Palu
***Department of Pediatric, Faculty of Medicine, Tadulako University, Palu
****Department of Obstetric-Gynecology,
Faculty of Medicine, Tadulako University, Palu

ABSTRACT

Background: Using wayer arrows in attack activities carried out by a person, or a group of people is rife in Palu. Arrow injuries are classified as low velocity, but can be significantly life-threatening when the vital organs are affected. Endoscope-assisted surgery is one of the techniques of penetrating sinus injury management. **Purpose:** To describe the management of a unique case in otorhinolaryngology field. **Case report:** A 21-years old male patient was diagnosed with penetrating ethmoid sinus trauma caused by a wayer arrow. Extraction was performed to release the arrow using an endoscope. **Clinical question:** What kind of foreign bodies can penetrate into the paranasal sinuses? Is endoscope-based surgery approach, the correct technique for penetrating sinus injury management? **Method:** A literature search was performed on Pubmed and Google scholar using keywords "foreign body", AND "sinus surgery", AND "wayer arrow". **Result:** The search obtained 19 articles, including 4 reports of wayer arrow penetrating paranasal sinus. **Conclusion:** The use of endoscopy for ethmoid sinus penetrating trauma gives good results.

Keywords: foreign body, sinus surgery, wayer arrow

ABSTRAK

Latar belakang: *Penggunaan anak panah dalam suatu kegiatan penyerangan yang dilakukan oleh satu individu atau kelompok orang, cukup sering terjadi di kota Palu. Cedera yang diakibatkan oleh anak panah tergolong dalam serangan berkecepatan rendah, namun dapat mengancam nyawa, terutama bila mengenai organ vital. Pendekatan tindakan bedah berbasis endoskopi adalah salah satu teknik dalam menangani cedera penetrasi pada area sinus paranasal.* ***Tujuan:*** *Untuk mendeskripsikan penatalaksanaan kasus unik di bidang THT.* ***Laporan kasus:*** *Pria 21 tahun didiagnosa dengan trauma penetrasi sinus etmoid akibat anak panah. Tindakan ekstraksi berhasil dilakukan dengan menggunakan pendekatan endoskopi.* ***Pertanyaan klinis:*** *Benda asing apa yang bisa menembus ke dalam sinus paranasal? Apakah penggunaan endoskopi merupakan pendekatan yang tepat untuk digunakan dalam kasus trauma tembus sinus paranasal?* ***Metode:*** *Penelusuran literatur lewat* PubMed *dan* Google Scholar *dengan menggunakan kata kunci "benda asing', DAN "operasi sinus", DAN "anak panah".* ***Hasil:*** *Didapatkan 19 artikel, termasuk 4 laporan kasus tentang anak panah yang menembus kedalam sinus paranasal.* ***Kesimpulan:*** *Penggunaan endoskopi dalam penanganan trauma tembus sinus ethmoid memberikan hasil yang baik.*

Kata kunci: *benda asing, bedah sinus, anak panah*

Correspondence address: Christin Rony Nayoan. Department of Otorhinolaryngology Head and Neck Surgery, Faculty of Medicine, Tadulako University, Palu. Email: ch.lapadji@gmail.com

INTRODUCTION

Foreign body penetrating the paranasal sinuses is a unique and uncommon occurrence, and can be categorized as either traumatic or iatrogenic. Iatrogenic foreign bodies include complete teeth, tooth roots, dental cement, fragments of broken forceps, and impression paste; whereas traumatic foreign bodies include glass, stones, wood, and bullets from gunshot wounds. Most often, skin wounds, contusions, avulsions, and cuts are visible.[1,2]

On average, 11% of all ENT life threatening situations involve foreign bodies. Associated eye trauma represents 5% of all cases of blindness in developing countries. Penetrating foreign bodies in the paranasal sinus is rare, but nowadays, otorhinolaryngologists still see cases of accidental and murderous arrow injuries. The most frequently affected structures are the frontal and maxillary sinuses, as well as the cranial orbit. On the other hand, damage to the ethmoid and sphenoid sinuses is uncommon, but can have potentially fatal outcomes.[3-5]

Penetrating injuries in head and neck are dangerous and should get emergency treatment, considering the vital structures underneath. There is a potential risk of vascular and nerve injury.[6] Using wayer arrows in attack activities carried out by a person, or a group of people, is rife in Palu. The sharp shape of the wayer arrow causes a penetrating wound. It usually encountered several difficulties in its management, such as infection and difficulty removing the arrows due to serrated structures that damaging muscle tissue.

Arrow injuries are considered as low velocity injuries but can be life threatening, especially when vital organs are affected. The severity and extent of the injury depends on the range at which the arrow is fired, the degree of penetration, and whether the arrowhead is coated with poison.

Arrow injuries can affect any part of the body. Cases of arrow wounds to different parts/organs of the body have been reported, such as: extremities and extremity blood vessels, abdomen and abdominal viscera, chest, heart, neck, supraorbital area, eyes, skull base, brain, and sometimes affecting multiple organs. Arrow wounds to the head and neck area can be devastating and life threatening. An arrow shot to the head and neck can easily penetrate and damage large blood vessels, and the patient may experience massive bleeding, spreading hematomas, or shock.[8]

We reported a case of endoscopy-assisted extraction of a penetrating wayer arrow in the ethmoid sinus, and the management of this case was quite challenging. Nevertheless, the missile should be removed, otherwise it could induce pain and infection. The purpose of this case report was to describe the management of a unique case in otorhinolaryngology field.

CASE REPORT

A 21-year-old male patient presented with a complaint of gunshot wounds by a wayer arrow. The metal arrowhead was embedded in the canthus area of the right eyeball. The arrow stuck and sank into the nasal bone, and the arrow tail was made of raffia rope. There was a small amount of bleeding at the edge of the wound (Figure 1), and the eyeball examination was normal.

Figure 1. Penetrating injury over the root of the nose.

Physical examination showed the arrow was stuck into the right medial canthus nasal bone, and drops of blood came out of the nose. On palpation, the arrow was stuck firmly and unable to be moved. The patient felt pain when palpated in the arrow area, and also when the wound area was tapped, but not on the percussion in the frontal sinus area. Conventional radiological examination (Figure 2) showed a radiopaque foreign body at the infra-marginal orbicularis sinistra, until it penetrated the left sphenoid sinus.

Figure 2. Foreign body penetrating the inframarginal orbicularis sinistra

CTscan (Computed Tomography) examination showed the presence of metal density material that penetrated the ethmoid cell to the left masseter, hyperdense lesion at bilateral ethmoidal sinus and left maxillary sinus, and fracture of the right ethmoid bone (Figure 3). Based on the history, physical examination, and investigations, it was concluded that the working diagnosis in this patient was penetrating transnasal injury with a metal foreign body, i.e. a wayer arrows. The action plan was to extract the foreign body arrow using endoscopy, with general anesthesia. Preoperative laboratory and anesthesia examination obtained average results.

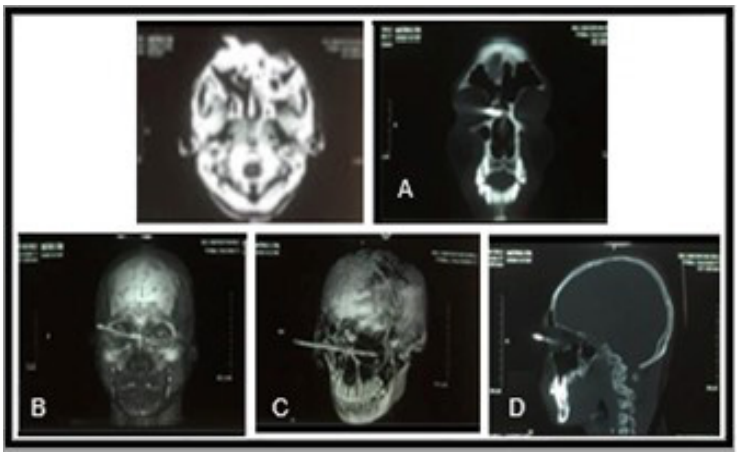

Figure 3. (A). The CT scan showed a metal density penetrating the ethmoid cell to the masseter muscles; (B, C) Hyperdense lesion at bilateral ethmoidal sinus and left maxillary sinus; (D) Fracture of the right ethmoid bone

During surgery, a nasoendoscopy procedure was performed on the left the nasal cavity to trace the arrow. The arrow body appeared to slip into the superior nasal septum on the right side of the endoscope, and upon continual tracing, it appeared that the arrow had penetrated the posterior ethmoid sinus. Anterior ethmoidectomy was performed using Blakesley forceps and cutting forceps, treading the arrow into the posterior ethmoid, proceeded with posterior ethmoidectomy, and finally the arrow tip was visible in the posterior ethmoid sinus. The extraction was then performed till the arrowhead left the ethmoid sinus to the nasal septum, and keep on until the arrowhead got through the nasal septum. Then, the extraction procedure was overseen by the endoscope in the right nasal cavity, until it could be freed from the posterior nasal bone. The wound was then debrided until all was clean. The bleeding was controlled using sterile gauze and spongostan. The wound was sutured layer by layer using vicril 4.0 on the inside, and prolene 5.0 on the outer skin. After surgery, the patient was transferred to the recovery room and received post-operative therapy, 1cc intramuscular anti-tetanus, as well as 1 gram Ceftriaxone every 8 hours, 10 mg Dexamethasone every 12 hours, and 30 mg Ketorolac per 8 hours, intravenous, respectively. Upon follow-up three days after the operation, the patient complained of pain with VAS 3 (Visual Analogue Scale point 3) no bleeding, minimal skin edema, and no complaints of visual disturbances.

CLINICAL QUESTION

What kind of foreign body that can penetrates into paranasal sinuses and is endoscope base surgery approach, the correct technique for penetrating sinus injury?

Table 1. Various kinds and pathways of penetrating foreign body

Study	Patient age	Foreign body	Path of the foreign body	Management
Abdullahi, et al.[8] (2020)	25	Arrow	Transnasal, from the left side of the nose into the maxillary antrum, posterior-medially into the nasopharynx	Lateral rhinotomy - dissection
	28		The floor of the orbit obliquely downward into the maxillary sinus	Lateral rhinotomy incision - diseection
Dehgani Mobaraki et al.[9] (2016)	-	Nail of Nail Gun	Near Neurovascular structure of Orbit and Skull base	Combined external-endoscopic endonasal assisted removal
Liebelt et al.[10] (2016)	43	Screwdriver	Through the maxillary sinus, the ethmoid, sphenoid, and clivus just to the inner cortex	Through the maxillary sinus, the ethmoid, sphenoid, to the clivus
Yücel A et al.[11] (2018)	4	Knife	Transnasal, right nasal cavity, and sphenoid sinus end up on the right side of cella turcica.	Endoscopic transnasal repair, with fascia lata graft and nasoseptal graft

METHOD

Literature search was carried out using keywords: "foreign body", AND "sinus surgery", AND "wayer arrow", through PubMed and Google Scholar, with range time published between 2015 to 2025. Selection was based on inclusion criteria as follows: 1) penetrating sinonasal trauma, 2) transnasal injury, and 3) endoscopic transnasal based surgery. Exclusion criteria were: no sinus involvement, nontraumatic injury (i.e., iatrogenic), and the high velocity projectiles.

RESULT

There are various foreign body which can penetrate the sinus cavity, one of them is arrow. The use of endoscopy in the management of penetrating ethmoid sinus trauma provides clear illumination and good visualization, therefore the operation outcome will be good and the patient can survive without any sequelae.

DISCUSSION

Incidence of foreign body in ENT field is quite high, and sometimes related to other nearby organ structure such as eyes and brain. Accidental and homicidal arrow injuries presented to an otorhinolaryngologist are still a stark reality in this modern era. About 50% to 75% of all foreign bodies in the paranasal sinus were found in the maxillary sinuses. The structures most often involved were the cranial orbit, frontal, and maxillary sinuses. In contrast, the ethmoid and sphenoid sinuses were rarely damaged, but they have the potential for life-threatening consequences.[1-3]

Foreign bodies penetrating paranasal sinuses are rare; they may be classified as traumatic or iatrogenic. Traumatic foreign bodies include bullets from gunshot injuries, pieces of glass, stones, and wood; while iatrogenic foreign bodies include whole teeth, roots of teeth, dental cement, parts of broken forceps, and impression paste. Tissue avulsions, lacerations, contusions, and skin wounds are mostly obvious.[4,5]

Penetrating injuries in the head and neck are dangerous and deserve emergency treatment, considering the vital structures underneath. There is a potential risk of vascular and nerve injury.[6] The sharp shape of the wayer arrow causes a penetrating wound. It usually encountered several difficulties in its treatment, such as infection and difficulty removing the arrows due to serrated structures that damage muscle tissue.[7] Arrow injuries are classified as low velocity, but can be significantly life-threatening when the vital organs are affected. The severity and extent of the injury depend on the range at which the arrow is fired, the degree of penetration, and whether poisons were applied to the tip of the arrow. Arrow injury can affect any part of the body. Cases of arrow shots involving different regions/organs of the body have been reported, such as limb and limb vessels, abdomen and abdominal viscera, chest, heart, neck, supraorbital area, eyes, base of skull, brain, or even multiple organs. Arrow injury to the head and neck region can be devastating and life-threatening. An arrow shot to the head and neck can easily penetrate and injure significant blood vessels, and the patient may present with massive bleeding, expanding hematoma, or shock.[8]

There are various kinds of transnasal penetrating foreign body injuries, for example, arrows,[8] nail of the nail gun[9], screw driver,[10] and knife.[11] Various paths for penetrating foreign bodies in the head and neck region exist. (Table 1).

In this presented case, the patient experienced penetrating trauma caused by a wayer arrow. The wayer arrow was shaped like a serrated arrow, with an iron or aluminum base material, fired by a slingshot or a rubber thrower. Wayer arrow is often found in Sulawesi province, especially in Gorontalo and Manado.[12,13] The use of wayer

arrows in attack activities carried out by a person or a group of people is rife in the city of Palu. This case was the first to be reported in the Otorhinolaryngology media.

There was no vital structure injured in this case. The appearance of foreign body in the ethmoid air cells posed a challenge, due to the complex anatomy of these paranasal sinuses and the proximity of vital structures like the orbitas, the cribriform plate, the duramater, and adjacent crucial structures like arteries and nerves. An additional difficulty lies in blast injuries, as they usually destroy soft tissues and bones, thereby distorting the local anatomy. Penetrating trauma with a pointed instrument into the nostril may result in death by injuring the brain through the cribriform plate of the ethmoid bone. Attempting endonasal endoscopic removal is deemed prudent, cautious of brain parenchymal violation.[4]

Radiologic examinations, such as X-ray or CT scan, can quickly identify the presence of metallic foreign bodies, as we performed in this case. Wood and weed are natural circumstances for bacteria, and are highly associated with brain infections. Also, the plant (wood and weed) is difficult to identify on X-ray or CT; subsequently, magnetic resonance imaging (MRI) is required to determine the presence of alien plant bodies. Plastic foreign bodies are relatively rare to produce brain infection and inflammation. They are also radiolucent, and a CT scan or MRI is required. Clinical and radiological examinations are necessary to confirm the diagnosis and planning the extraction, whether to use endoscopy. Endonasal endoscopic exploration can be beneficial to remove the fragments safely.[6,9]

Foreign bodies impacted and retained for a long time in the paranasal sinuses may lead to infection and the formation of aneurysms. A foreign body lodged in the posterior ethmoid cells can also affect the optic nerve and anterior cranial fossa structures, which are closeby. It also can lead to chronic and recurrent sinusitis by causing foreign body granulomas. Eyelid lacerations involving the medial canthus can be signs of damage to the canalicular drainage system. Fortunately, there was no canalicular drainage damage found in this case. Hence, even asymptomatic missile fragments should be removed to prevent complications.[5]

Using a rigid nasal endoscope has revolutionized the surgery of the paranasal sinuses. Although the endoscope has been primarily used for treating sinusitis, it has also been used for other intranasal procedures, such as transnasal endoscopic approach to access skull base.[9] In this case, we performed transnasal endoscopy to extract the wayer arrow. The reason to use the endoscope, in this case, was an endoscopic ethmoidectomy approach to the posterior ethmoid cells, which offerd a direct view, bright illumination, and good visualization of the ethmoid cells. Endoscopic surgery had allowed for a safe and minimally invasive approach to removing the foreign body. Complications of these penetrating injuries are variable, depending on the velocity and trajectory of the object. In terms of neurologic complications, meningitis was the most common. Patients with delayed presentation were more likely to develope meningitis.[14] The patient, in this case, showed no complications due to trauma, and no sign of complication during follow-up.

In conclusion, endoscopy management of penetrating ethmoid sinus trauma provides clear illumination and good visualization of ethmoid cells, minimizing invasive processes when removing foreign objects, and gives a good outcome.

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