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Case Report

A Case Report of Anesthetic Challenges in a Patient with Eagle Syndrome

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Abstract

Elongation of the styloid process (ESP) was described by Pietro Marchetti in 1652 but it was not until 1937 that the clinical symptomatology of Eagle Syndrome (ES) was characterized by the otolaryngologist Watt Weems Eagle. The normal styloid process is defined as 2.5 to 3 cm although there are some reports of lengths up to 4 cm. Radiological ESP or calcified stylohyoid ligaments are relatively common but symptomatic ES remains rare and is often misdiagnosed with distinct perioperative challenges due to upper airway distortion which may make intubation difficult and vascular compression (stylocarotid syndrome) which may cause transient ischemic attack, stroke or dissection. Symptoms ranging from dysphagia and odynophagia to syncope and neurologic deficits require vigilance as demonstrated in our case of a 25-year-old male who presented with a 12-month history of intermittent analgesia for cervical pain and sensation of a foreign body in the pharynx, diagnosed with ESP and planned for styloidectomy at Hawassa University Comprehensive Specialized Hospital. This case highlights the need for a comprehensive and multidisciplinary approach to successful perioperative management, including strict preparation for difficult airways following current guidelines, continuous neurological and hemodynamic monitoring to identify cerebral ischemia, multimodal analgesia for neuropathic pain, and a smooth, controlled extubation to avoid vascular injury. Furthermore, a detailed preoperative evaluation of nutritional status, medication history, and anxiety is essential, enhancing patient safety and achieving optimal surgical results in this diagnostically complex condition.

Keywords

Eagle Syndrome, Case Report, Perioperative, Management, Anesthesia

1. Background

Pietro Marchetti previously mentioned the elongation of the styloid process (ESP) in 1652, but it wasn't until 1937 that otolaryngologist Watt Weems Eagle first mentioned the clinical symptoms of the disease that now bears his name, Eagle Syndrome (ES); although some sources contend that the usual length may reach up to 4 cm, Eagle defined the length of a normal styloid process as being between 2.5 and 3 cm [1].

Because of potential structural alterations in the upper airway, ES poses a special challenge to airway management. Adjacent tissues may be compressed or distorted by ESP or calcified stylohyoid ligaments, making airway visualization and intubation challenging [2]. There is stark disparity between its incidence and its low rate of symptomatic presentation. Diagnosis is often missed preoperatively, making awareness of this

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syndrome essential for managing unexplained perioperative pain [3-9].

ES has been recorded in two different forms “classic" more prevalent ESP and the extra cranial internal carotid artery is compressed or divided by the Extended styloid process has been recorded in two different forms: classic and stylocarotid syndrome, which can cause transient ischemic attack or stroke [1]. The cerebral ischemia caused by vascular compression, injury to the carotid arteries from embolization or dissection, or a vasovagal reaction are just a few possible causes for the cerebrovascular features of ES [10]. Retroauricular and occipital pain, which gets worse when the head rotates laterally; dysphagia (difficulty swallowing); odynophagia (pain during swallowing); tinnitus; weakness of the tongue; altered speech; intermittent loss of taste; neck swelling; dry mouth; restricted mouth opening; or, if carotid compression is present, episodes of fainting or stroke are a few of the symptoms of ES [11]. This hidden vascular hazard necessitates extreme caution during positioning and instrumentation.

2. Case Presentation

A 25 years old Sidama ethnic male patient admitted to Hawasa University Comprehensive Specialized Hospital with chief compliant of cervical pain, foreign body sensation in the throat and pain during swallowing. He was diagnosed with ES and planned for styloidectomy. Associated to this he was using different medications intermittently for the past 12 months to relief pain like Non-steroidal anti-inflammatory drugs (NSAID)s (Paracetamol, Diclofenac) and others. Otherwise he has no history of hearing sound (ringing) in the ear, ear pain, dental pain, has no previous Anesthesia and surgical exposure, hypertension and other comorbidities.

Preoperative vital signs of the patient were in normal ranges with Blood pressure of 126/70 mmHg, pulse rate of 84 beat/minute, respiratory rate of 20 breath/minute and afebrile to touch. Additionally, on physical examination the respiratory system was clear and resonant, S1 and S2 were well heard, abdomen was flat and moves with respiration, the patient was conscious to time, place, person and there was no other pertinent finding on physical examination.

Pre-operative laboratory findings was included complete blood count (hemoglobin = 16 g/dl (12.5-16.3) g/dl, hematocrit = 40.4% (36.7-47.1) %, platelet count = 305 (152-348 ×103/L) and neck Computed Tomography (CT) findings showed an ESP with calcified stylohyoid ligament which measures 6 cm, 6.2 cm in size of right and left sided respectively. Additionally, the CT scan revealed that the naso-pharynx, oro-pharynx and hypo-pharynx had normal mucosa, spaces of the neck are normal, portions of maxillary, sphenoid sinuses with mastoidal air cells are clear; the glottis, supra glottis space, subglottis space and apical lungs were unremarkable and it concluded that ESP secondary to calcified styloid ligaments represents ES (Figure 1).

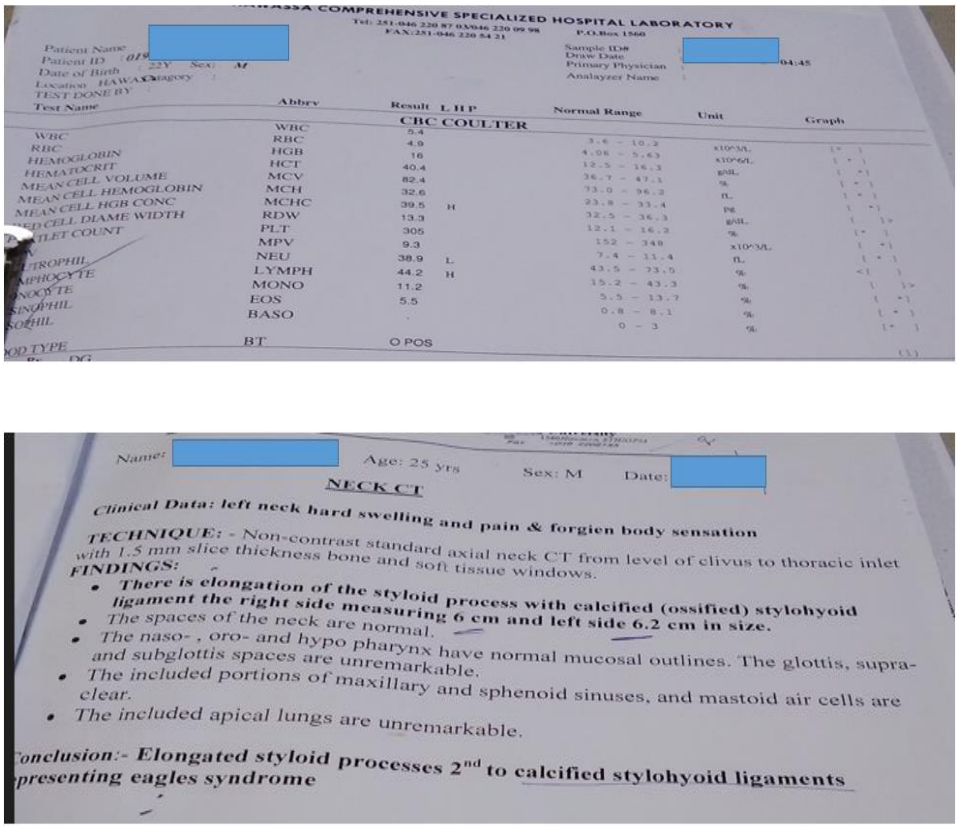

Figure 1. *Pre-operative patient investigations.*

After arrival of the patient to operation theatre vital signs were taken and 8 mg dexamethasone, 50 mg pethidine was given. Additionally, the patient was induced with 1:2 ketofol (50 mg Ketamine with 100 mg propofol), relaxed with 100 mg suxamethonium and he was intubated. Anesthesia was maintained with a total of 8 mg vecuronium, 1.2 % of Isoflurane and the patient was taken 3000 ml of normal saline.

After the patient intubated he was positioned to right lateral and draped; aseptic technique was used and incision was started. The intra operative vital signs of the patient was stable; by which blood pressure was maintained with systolic blood pressure of 120-133 mmHg, diastolic blood pressure of 60-75 mmHg, pulse rate within 75-95 beat/minute, peripheral oxygen saturation 99% and urine output of 250 ml. Additionally, there was minimal blood loss (< 500 ml) and uneventful intra operative conditions were observed. Extra oral surgical approach was done and 3cm styloid process was removed successfully (Figure 2). The patient was smoothly awaken and transferred to the recovery.

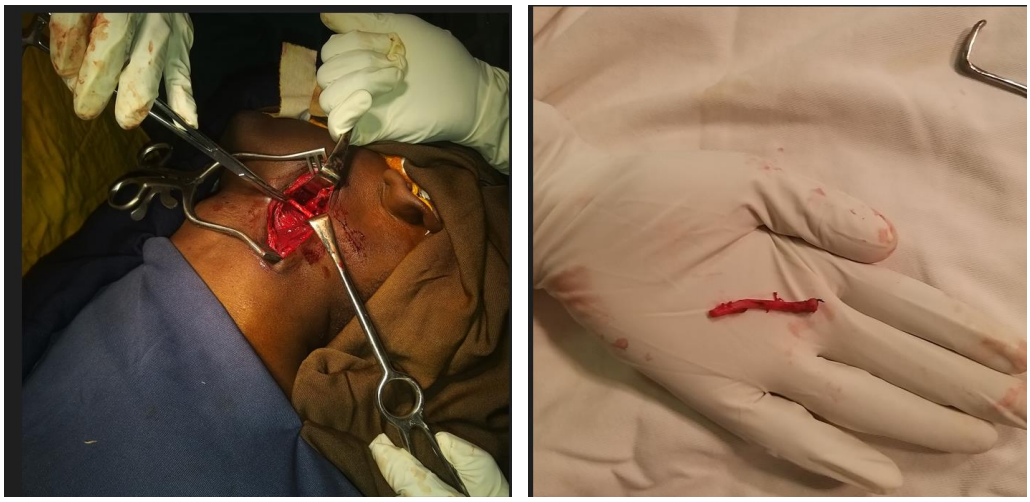

Figure 2. *Patients' ESP.*

3. Discussion

A case report done on ES in 2014 implied that patients with ES symptomatically present dysphagia and odynophagia [8]. Additionally, a case report on battling the eagle's sharp beak, ES, showed that patients experience dysphagia and odynophagia [12]. The study done by Qureshi et al. 2018 on ischemic stroke secondary to the stylocarotid variant of ES implied difficulty swallowing, odynophagia, and a sensation of a foreign body in the pharynx [2]. Preoperatively assessing patients' nutritional status is crucial [13].

A study done on trauma-induced ES by Koivumaki et al. 2012 stated that patients presented with headaches, pain in the throat and ear, as well as pain when tilting the head [9]. A case report on ES in pediatrics by Tanenbaum et al. 2022 showed patients faced a non-specific complaint of pain radiating from the throat to the ear or mastoid process [14]. A case report done by Kim, Hansen, and Frizzi on ES showed that patients with ES elucidate symptoms of otalgia, pain within the neck due to changing of head position, and shoulder pain [15]. Identifying the pain history of the patient preoperatively is important [16].

A case report on nonsurgical treatment of ES by Han et al. 2013 showed patients might be treated with long-lasting steroids, oral antidepressants, anticonvulsants, and local anesthetics conservatively [17]. A case report by Ozakovičová V, Onderka A, Res O, et al. (2023) on the diagnosis and treatment of ES and possible complications implied conservatively patients could be treated with non-steroidal and anti-inflammatory drugs with anticonvulsants or antidepressants depending on their symptoms [18]. Additionally, a case report by Bacaksiz et al. (2022) revealed ES could be treated with steroid-containing drugs and antidepressants; as a result, preoperative drug regulation should be done [19]. Assessing preoperative medication history is important [20].

A case report on bilateral ES with associated internal carotid artery kinking and significant stenosis demonstrated that patients with ES may present with a variety of symptoms, including aphasia, paralysis, syncope, dissection, or an external carotid artery pseudoaneurysm [21]. A case report from 2020 on rare complications of ES showed that cervico-facial discomfort, syncope, and even stroke could be linked with ES [11]. A study done on ES cerebrovascular complications in Los Angeles, America, suggested that cerebral ischemia caused by vascular compression, injury to the carotid arteries from embolization or dissection, or a vasovagal reaction are just a few possible causes for the cerebrovascular features of

ES [10]. Furthermore, a review article on perioperative neurological evaluation by Benesch et al. (2021) emphasized the importance of thoroughly assessing patients' neurological history [22].

A 2012 review on the management of ES revealed that misdiagnosis could lead to unnecessary treatments, making an accurate initial diagnosis crucial [23]. A case report on ES as cause of TIA done at University of Miami, Florida implied the relationship between the process and the exterior and internal carotid arteries will be visible by neck angiography. Maintaining the patient in a symptomatic position for the many minutes needed for perfusion CT and MR imaging would put him or her at danger. This is the reason a dynamic catheter angiography performed, which revealed the specific area of stenosis as soon as the head was turned [24]. Another case report on stylocarotid syndrome with internal CAD by Smoot et al. 2017 emphasized the diagnosis of stylocarotid syndrome, CT imaging is crucial. The link between an ESP and nearby blood arteries can be better determined when three-dimensional reformatting is employed with CT imaging [3].

A case report on perioperative anesthesia management in a patient with ES stated intraoperative position should be determined based on preoperative history of which position aggravates the patient's pain [19]. A case report by Osama Hafez et al. (2025) implied that intraoperative, patient position should avoid compression of vital structures around the neck [25].

A case report by Radak et al. (2016) suggested that several cranial nerve injuries (V, VII, IX, X) may result from trapping by granulation tissue following surgery or minor trauma, direct irritation, degenerative changes, or styloid process fracture. These causes are commonly seen in patients after tonsillectomy [21]. Additionally, a case report and literature review on ES revealed that patients may experience calcification of the stylohyoid ligament and the growth of osseous tissue at its insertion, which can occur due to reactive hyperplasia, reactive metaplasia, or abnormal healing following trauma [26]. Furthermore, a study by Yildirimyan et al. (2017) indicated that ES may present with symptoms such as tongue weakness, neck swelling, dry mouth, and limited mouth opening [27]. Therefore, preparing for a difficult airway is essential in these cases [28].

A case report on rare complications of ES done in 2020 implied a patient with ES could be monitored with neurophysiological monitoring, including techniques such as somatosensory-evoked potentials and motor-evoked potentials, and cerebral oximetry plays a crucial role in assessing the integrity of neural pathways during surgical procedures [11]. A case report on ES done by Moon et al. 2014 stated cerebral oximetry provides a sensitive measure of cerebral oxygenation—it enables the surgical team to titrate anesthesia and hemodynamic management to maintain optimal cerebral perfusion throughout the procedure, and it enables the team to adjust the patient's head position in real time. Furthermore, cerebral oximetry monitoring can help manage other causes of cerebral hypoperfusion, including hypotension, or excessive blood loss [4].

A case report done on ES in 2014 showed that in the context of vascular ES, where compression of cranial nerves and adjacent structures may occur, neurophysiological monitoring provides real-time feedback on the functional status of these nerves, aiding in preventing neurological injury. When the anesthesiologist uses the lateral decubitus position, cerebral oximetry monitoring is particularly valuable because of the potential risk of hemodynamic fluctuations and cerebral hypoperfusion. The proximity of the carotid arteries to the stylohyoid bone increases the risk of inadvertent compression [8]. Early recognition of such complications allows for prompt intervention to prevent neurological sequelae and optimize patient outcomes [25].

A study by A. Badhey et al. (2017) on ES reported that analgesics such as NSAIDs, along with alternative treatments combining anticonvulsants, antidepressants, local injections, and manipulation, can be effective for pain management. Stellate ganglion blocks or local injections of 1 mg triamcinolone/mepivacaine have been shown to provide almost complete symptom relief [29]. Additionally, a randomized controlled trial comparing landmark-guided and ultrasound-guided glossopharyngeal nerve blocks in ES found that the ultrasound-guided block, using 1.5 mL of 0.5% ropivacaine and 20 mg of methylprednisolone injected posterior to the internal carotid artery in the submandibular region, offers superior pain relief [30].

A letter to the editor discussing the potential role of dexmedetomidine during the perioperative period in hypertensive patients with ES highlighted dexmedetomidine's effectiveness in attenuating the pressor response when administered as an infusion of 1 μg/kg over 15 minutes preoperatively. Dexmedetomidine offers both strong analgesic properties and sympatholytic effects, suggesting it could become a valuable drug in similar clinical scenarios [31]. Additionally, a case report on superficial cervical plexus block and ultrasound-guided styloid process infiltration in ES indicated that ultrasound-guided local anesthesia infiltration combined with a superficial cervical plexus block can provide adequate pain management [32].

A case report on the non-surgical treatment of ES by Taheri et al. (2014) stated that a glidescope is a superior tool compared to direct laryngoscopy in situations where intubation may be challenging. To minimize the risk of surgical complications, smooth emergence and extubation techniques are employed, alongside the innovative use of lidocaine and dexmedetomidine [7].

4. Conclusion

The patient's perioperative management approach is crucial. Preoperative assessment of patients' nutritional status, pain, medication history, airway, and vascularity of the syndrome are important. Intra-operatively appropriate difficult airway preparation, positioning, standard neuro monitoring, pain management, and smooth extubation techniques play a vital

role in anesthetic management of patients with ES.

Abbreviations

CT	Computed Tomography
ES	Eagle Syndrome
ESP	Elongated Styloid Process
NSAID	Non-Steroidal Anti-Inflammatory Drug

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Author Contributions

Semon Mengistu: Conceptualization, Data curation, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing

Mengistu Feye: Conceptualization, Data curation, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft

Conflicts of Interests

The authors declare no conflicts of interest.

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