Case report

Tracheotomy Cannula as a Foreign Body in Pediatric Airway Management

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ABSTRACT

Proper airway management is a challenge for every anesthesiologist. During a shift in the emergency room, a difficult airway often appears both in cases of trauma and medical pathology. The tracheotomy cannula is a device suited to ensure airway opening of patients with obstruction or lesion of the upper respiratory tract. In this medical case, a 7 year old female child is admitted at the emergency service with an episode of respiratory distress caused by rupture of a silver tracheotomy cannula, previously implanted due to a submandibular tumoral lesion. This is a rare case with little investigation in international medical literature. The case was approached with interdisciplinary management including Pediatric surgery and Pulmonology with satisfactory outcome.

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Cánula de traqueostomía como cuerpo extraño en vía aérea pediátrica

RESUMEN

El manejo adecuado de la vía aérea es un reto para el médico anestesiólogo. Durante un turno de urgencias es frecuente, tanto en traumatismos como en patologías médicas, la presentación de casos clínicos con vía aérea difícil. La cánula de traqueostomía es un dispositivo diseñado para permeabilizar el tracto respiratorio de pacientes con obstrucciones o lesiones en la vía aérea superior. En este caso clínico, se presenta a una niña de 7 años de edad que ingresó al servicio de urgencias con episodio de dificultad respiratoria por rotura de una cánula de plata de traqueostomía que se le había colocado por lesión tumoral submandibular, caso de poca presentación y con pocos reportes en la literatura médica internacional. Fue manejado en forma interdisciplinaria con el grupo de cirugía pediátrica y neumología pediátrica, con buen resultado clínico.

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Case report

This is the case of a seven year old female patient with a history of a submandibular cavernous lymphangioma type lesion extended to the supraglottic area, undergoing outpatient care management for several years with a tracheotomy cannula. The child had neck trauma caused by a fall while playing outside, which resulted in rupture and fragmenting of the silver tracheotomy cannula and subsequent airway obstruction by a piece of the cannula. Her family arrives at the Hospital Universitario del Valle Pediatric Emergency service in Cali with the patient due to an episode of mild respiratory distress and showed the physicians the upper fragment of the cannula (figs. 1 and 2).

Pediatric Surgery assessment requested emergency admittance into the operating room for foreign body extraction. Anterior-posterior and lateral chest X-rays are carried out with portable X-ray equipment (figs. 3 and 4) showing the lower fragment of the cannula in the patient’s airway.

Medical history

Pathologic record. A submandibular mass is found at birth, which progressively increased its size and compromised the airway at a supraglottic level, causing respiratory distress, seizures, gastrointestinal reflux, duodenitis and recurrent pneumonia.

Surgical history. At age 11 months, a biopsy sample of the mass is taken, an open tracheotomy and placement of a silver cannula are carried out.

Biopsy findings. Cavernous lymphangioma.

Pharmacological management. Valproic acid suspension 5 ml every 12 hours.

Anesthetic management

Once the case was reported, we reviewed the medical record and carried out physical examination and assessment of the X-rays jointly with the Pediatric Surgery and Pulmonology services. Clinical, surgical and anesthetic management hypotheses are established considering different alternatives during the procedure of extraction.

Surgical procedure plan

We are equipped with a flexible bronchoscope, a rigid bronchoscope and a pediatric surgery equipment for performing a foreign body extraction from the airway in a pediatric patient.

Basic monitoring, cardioscopy in EKG lead II, pulse oximetry, non-invasive blood pressure measurement with pediatric bracelet and capnography were carried out. The patient was placed in supine and Semi-fowler position.

The patient weighed 20 kg and was previously oxygenated using a no. 2 pediatric mask. We used ranitidine and metoclopramide for aspiration prophylaxis. We gave 1 mg of midazolam and begun intravenous anesthesia with 50 mg of sodium thiopental and continued maintenance with 3-4% sevofluorane, achieving spontaneous respiration.
during the entire procedure. An oropharyngeal Guedel airway cannula was placed. Local infiltration at tracheotomy orifice was performed by the pediatric surgeon using 20 mg of 1% lidocaine. Next, the surgeon carried out an incision surrounding the ostium, expanded the orifice and extracted the lower piece of the silver cannula through the tracheotomy opening with a Kelly surgical clamp. There were no complications during the procedure (fig. 5).

We continue to secure the airway with a no. 4 pediatric endotracheal tube through the orifice of the tracheotomy and the patient adapted to the manual ventilation system, sustaining spontaneous respiration. Considering the event of neck trauma during the patient’s fall and the history of the supraglottic mass, Pediatric Pulmonology proceeds to a diagnostic flexible bronchoscopy. Findings reported a displaced, pale, lobed mass in hypopharynx compatible with a cavernous lymphangioma type lesion obstructing the airway in supraglottic and parapharyngeal areas; and observation of vocal chords was difficult.

We decided to continue airway management with a plastic tracheotomy cannula. The endotracheal tube was then removed and a no. 5 plastic tracheotomy cannula through the opening of the tracheotomy. The patient tolerated the procedure well. A 30 mg/kg dose of dipyrone is given as analgesia together with 0.6 mg of dexamethasone. Once the patient regained consciousness, she initially remained in the post-anesthetic care room. She was awake, hemodynamically stable, and in her family’s company. She was later transferred to clinical post-operative monitoring and management of respiratory therapy in the Anna Frank Pediatric Surgery ward at Hospital Universitario del Valle, Cali with a positive outcome. Before discharge, the plastic cannula was replaced by a Ruschelit Biesalski.
Discussion

Interdisciplinary management is crucial for patients with airway obstruction by a foreign body. This strategy provides alternatives during the initial approach and case management from anesthetic and surgical standpoints,\textsuperscript{16,17} properly assessing different risk and benefit variables.

The patient arrived at the emergency service after neck trauma. Aspiration prophylaxis was fulfilled with ranitidine\textsuperscript{22} and metoclopramide. In this case's management of airway trauma no muscular relaxants were used during anesthesia, therefore preserving physiological mechanisms of spontaneous ventilation in order to prevent collapsing of structures of the damaged airway. Also during anesthesia, proper and balanced inhalation and intravenous anesthetic techniques were ensured. For this, the algorithm for difficult airway management and ASA guides must be taken into account\textsuperscript{12,13}.

Nevertheless, anesthetic management through controlled ventilation with use of muscle relaxants for extraction of foreign bodies in the aerodigestive tract is also an option. It shows lower incidences of lung atelectasis, cardiac arrhythmias and myocardic depression; associated to lower doses of inhaled and intravenous agents.\textsuperscript{23}

It is necessary to provide the operation room with diagnostic and medical equipment as well as surgical tools for emergency airway management; including sternotomy equipment for distal approach of the intrathoracic trachea when securing the airway in extremely urgent cases.\textsuperscript{24}

Once the medical, surgical and anesthetic managements are established and therapeutic alternatives are clear, the priority procedure must be carried out immediately. Additionally, a place in the pediatric intensive care unit must be requested for post-operative management.

Morbidity and complications that may occur during the extraction of foreign bodies from the aerodigestive tract must be considered\textsuperscript{25}. The patient's family must be notified and asked for authorization to carry out the procedure with informed consent.

The silver tracheostomy cannula is a device suited for airway management of pediatric and adult patients with severe obstructive lesions. Its use was favored in the past for outpatient care, though currently it is progressively decreasing due to advances in new tracheostomy cannulae\textsuperscript{2}. The weakening of the metallurgic alloy caused by oral secretions eventually leads to deterioration of these devices. It is difficult to determine in this case whether if the cannula was structurally damaged, or if the metal or the welding contributed to its breaking associated to trauma.

Although common in emergency services, obstruction by foreign bodies in the aerodigestive tract such as this is unusual: pediatric trauma resulting in airway obstruction by the tracheostomy cannula due to a tumoral lesion management.

Conflict of interests

None declared.

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REFERENCES