How-to-do-it

Posterior wall laceration of the thoracic trachea: the transcervical–transtracheal approach

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Abstract
A large membranous wall laceration of the thoracic trachea was surgically treated. The surgical approach consists on a low collar incision followed by a longitudinal tracheotomy. The membranous tear was repaired with a running suture and tracheotomy sutured with interrupted crossed stitches. The procedure was effective and endoscopic follow-up showed a perfect healing process with no signs of tracheal stenosis. This new technique proved to be a reliable, quick and safe procedure, which allows to repair membranous lacerations as far as the carina, avoiding thoracotomy.

Keywords: Tracheal wall laceration; Transcervical–transtracheal approach

1. Introduction
Membranous tracheal wall lacerations are often associated to tracheal intubations carried out for general anesthesia or in emergency. It is a rare but serious complication whose first clinical signs generally are hemoptysis and subcutaneous emphysema [1,2]. While smaller and superficial tears may heal spontaneously, deeper and longer lacerations, especially if the patient is symptomatic, require prompt surgical repair [2,3]. We describe herein the technique we utilized to repair a large membranous tears of the thoracic trachea just over the carina.

2. Material and methods
In the last 4 years six patients with a post-intubation membranous tracheal wall rupture were treated in our institute with a new surgical approach. The first five cases were with a tear of the middle trachea and they have been object of a previous paper [4]. The last patient, object of this paper, was a 71 year old female who underwent general anesthesia for a videolaparoscopyc cholecystectomy in another hospital. She developed, immediately after extubation, subcutaneous emphysema with haemoptysis, dyspnoea, and pneumomediastinum. Bronchoscopy was immediately performed when she arrived at our attention and confirmed the presence of a 60 mm laceration of the thoracic trachea whose distal end was just at the carina.

She underwent general anesthesia and was again intubated, under bronchoscopic view, with a 5.5 mm (ID) single low-pressure cuffed orotracheal tube below the tracheal tear – selective in the left main stem. A low collar incision like that used for mediastinoscopy was performed. A minimal dissection, allowing to reach the pre-tracheal space, was made. Two traction sutures were applied in the anterior wall of the trachea in order to facilitate exposure, then the anterior tracheal wall was incised longitudinally along the midline, for the length of seven rings. Oortracheal tube was withdrawn and a second 4.5 mm (ID) sterile low-pressure cuffed flexible armoured endotracheal tube was inserted into the left mainstem through the tracheal incision. During the suture the endotracheal tube was withdrawn several times in order to adequately expose the tracheal tear. The laceration was repaired with an absorbable running suture (Fig. 1). The original orotracheal tube was re-advanced by the anesthesiologist beyond the suture into the left main stem and the longitudinal tracheotomy was closed with interrupted crossed stitches.

3. Results
The surgical procedure was effective and lasted 55 min.
There was no peri-operative morbidity. The patient was immediately extubated at the end of the operation and she was discharged after 4 days. Last endoscopic follow-up was at 9 months (mean of the overall series 29 months) and it showed a perfect healing process of the laceration with no symptoms or signs of tracheal stenosis, as well as in the other five patients treated this way.

4. Discussion

Lacerations of the posterior tracheal wall may be a serious problem leading to belated sequelae, such as a tracheal stenosis, or, more dangerously, to precocious and potentially lethal complications, such as a descending mediastinitis [1,3]. Their pathogenesis may be a blunt thoracic trauma or a tracheotomy but more frequently they are related to general anesthesia and many times occur after an intubation apparently carried out with no difficulty [1,2,5,6] – as in our experience [4].

The clinical and radiological diagnosis, suggested by the presence of subcutaneous emphysema, hemoptysis and pneumomediastinum, must always be confirmed by tracheo-bronchoscopy that, moreover, allows to establish location and extent of the tear, thus allowing to plan the correct surgical approach.

The severity of the possible sequelae suggest the surgical repair in the most of cases, and it should be performed as soon as possible [1,3].

In opposition to the traditional techniques [7], in 1995 Angelillo-Mackinley first reported the successful repair of a membranous tear of the cervical trachea through a mediastinoscopy-like incision and a longitudinal tracheotomy [2]. He probably took the idea from the report by Jacobs in 1978 who described two cases of post-tracheotomy posterior tracheal wall laceration promptly repaired with a single layer closure through the same tracheotomy [6]. Following Angelillo-Mackinlay’s idea we performed almost the same procedure in the first five patients, with a slight twist on the management of the airway. Thanks to the intubation from the operating field, alternating suturing with ventilation, we had the best manoeuvrability in repairing the distal end of the laceration.
the laceration. In the last patient, object of this report, this expedient and the traction sutures on the anterior wall of the trachea allowed us to extend the anterior tracheotomy two rings below and they were determinant in successfully repairing the tear reaching the carina, which otherwise should have required a thoracotomy.

A future and predictable development of this technique may be the introduction of a videothoracoscopic equipment which could allow to suture lesions extending to a main bronchus and through a shorter anterior tracheotomy.

The minimal invasiveness of this approach should reduce the doubts of those authors who prefer the conservative management advocating that the associated postoperative morbidity with the traditional techniques outweigh the risks of early and late sequelae. Moreover, such technique may be more acceptable both for the patient, his parents and the physician himself, above all if the lesion is a iatrogenic one.

References