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Clinical signs and radiographic evidence of esophageal perforation after tetraplegia

Signes cliniques et radiologiques des perforations œsophagiennes après tétraplégie

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Abstract

A diagnosis of esophageal perforation at some time after cervical spine surgery is difficult to establish since there exists no clinical picture specific to tetraplegic patients. We carried out a detailed retrospective study of revelatory clinical manifestations and conventional radiographic data in a series of 16 patients hospitalized at Hôpital Henry-Gabrielle (Lyon, France) for rehabilitation purposes between 1983 and 2010 and who presented this complication. The most frequent clinical picture associates cervical pain, fever and dysphagia. Simple front and side X-rays of the cervical spine led in 77% of the cases to a diagnosis of esophageal perforation. The most prevalent radiographic signs of the latter consist in osteosynthesis hardware or instrumentation failure, prevertebral free air next to the cervical esophagus and enlarged prevertebral space. Visualized esophageal X-rays, also known as series, highlight parenchymal opacity next to the posterior wall of the esophagus. A diagnosis of esophageal perforation needs to be carried out in order to facilitate suitable treatment and avoid the compromising of vital functions.

Keywords: Esophageal perforation; Tetraplegia; Radiography

Résumé

Le diagnostic de perforation œsophagienne à distance de la chirurgie cervicale est difficile à poser devant l'absence de tableau clinique spécifique dans la population de tétraplégiques. Nous avons réalisé une étude rétrospective détaillée des manifestations cliniques révélatrices et des données de la radiologie conventionnelle chez une série de 16 patients hospitalisés à l'hôpital Henry-Gabrielle pour rééducation entre 1983 et 2010 ayant présenté cette complication. Le tableau clinique le plus fréquent associe douleur cervicale, fièvre et dysphagie. Les radiographies simples du rachis cervical face et profil ont permis de suspecter le diagnostic de perforation œsophagienne dans 77 % des cas. Les signes radiographiques les plus fréquents sont une défaillance du montage du matériel d'ostéosynthèse, la présence de clartés aériques prévertébrales en regard de l'œsophage cervical et un élargissement de l'espace prévertébral. Le transit œsophagien permet de mettre en évidence une image d'addition en regard de la paroi postérieure de l'œsophage. Le diagnostic de perforation de l'œsophage est important à poser pour permettre un traitement adapté et éviter une mise en jeu du pronostic vital.

Mots clés : Perforation œsophagienne ; Tétraplégie ; Radiographie

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1. English version

1.1. Introduction

The annual incidence of traumatic spinal cord injury is estimated at 19.4 new cases a year by one million inhabitants in France, including 500 cases of cervical spinal cord injuries a year [2]. Treatment of cervical spine trauma is more often than not surgical, and it is aimed at achieving medullary decompression, fracture reduction and a stabilized cervical spine. The anterior approach of the cervical spine is presently the most widely used. It permits ablation of the bone and disc fragments likely to compress the dural sheath forwards, and the approach also facilitates diagnosis of a dural breach. Fracture reduction is completed by osteosynthesis with installation of a generally autologous bone graft accompanying the fixation hardware [1].

Esophageal perforation is a rarely encountered complication of anterior cervical surgery, and its incidence is lower than 1.5% [1,4,5]. The main revelatory clinical manifestations identified in a series of 44 cases following anterior cervical surgery [5] include fever, sore throat, neck pain, dysphagia, odynophagia, alteration of the voice and cervical induration. There also exist forms that are paucisymptomatic [6,15], asymptomatic [18] or associated with different complications (fistula, cellulitis, mediastinitis) that explain a delay in diagnosis [6,9]. A perforation diagnosis is confirmed by tomodensitometry (TDM) tests and magnetic resonance imagery (MRI) of the cervical spine as well as endoscopic exploration [5]. According to a preliminary study carried out in four tetraplegia patients presenting with an esophageal fistula [16], conventional radiography may prompt suspicion of a fistula diagnosis by underscoring indirect signs such as prevertebral free air behind the esophagus, an osteosynthesis device anomaly or enlargement of prevertebral space.

The objective of this work is to provide a detailed retrospective analysis of the revelatory clinical manifestations as well as conventional radiological data in a series of 16 patients presenting with post-traumatic tetraplegia complicated by an esophageal perforation.

1.2. Method

1.2.1. The population studied

Sixteen patients presenting with tetraplegia secondary to fracture of the cervical spine, operated through an anterior approach and complicated by an esophageal perforation, were included in the study. Between 1983 and 2010, these patients had been hospitalized in Hôpital Henry-Gabrielle (Lyon, France) for the purposes of rehabilitation. The esophageal perforation diagnosis had been confirmed in every one of these cases by endoscopic or intraoperative radiological explorations (esophageal series, TDM, MRI).

1.2.2. Method

This was a retrospective study. For each patient, data consisted in: age, sex, characteristics of the cervical spine trauma (cause, type of cervical lesion, presence of intracanal fragments or of a dural breech noted during the preoperative examination), type of surgical treatment carried out (corpectomy, discectomy, nature of the graft, the osteosynthesis instrumentation employed), presence of associated thoracic trauma, tetraplegia characteristics (ASIA and Frankel sensory and motor scores, last healthy neurological level), intubation duration and presence of a tracheotomy (Table 1).

Two types of parameters were studied:

- clinical manifestations revealing the perforation: cervical pain, dysphagia, pain when swallowing, fever, anterior cervical tumefaction, cervical outflow, meningitis, swallowing the wrong way, repeated respiratory events (bronchial congestion, pneumopathy, pleurisy);
- anomalies or abnormalities underscored by front and side X-rays of the cervical spine in a seated position: osteosynthesis hardware failure (shift in position of an osteosynthesis plate, shift in position or migration of a screw, presence of a screw in the interdiscal space or in the graft), prevertebral free air next to the cervical esophagus, enlarged prevertebral space, anomalous bone alignment and bone lysis, parenchymal opacity on the visualized esophageal X-rays using the contrast medium known as gastrografin.

1.3. Results

1.3.1. Characteristics of the population studied

Patient characteristics are presented hereinafter (Table 1). The population studied comprised 16 patients with a mean age of 28.38 years. The cervical spine trauma resulted in 13 cases from a traffic accident, in two cases from falling off a tree and in one case from a diving accident. All of the patients presented with sensory and motor tetraplegia. None of them presented with motor functions below the level of injury.

Eighty-one percent of the patients presented with cervical dislocation. All of the patients had undergone surgical treatment using anterior cervical approach with osteosynthesis associating the installation of a graft and the fixation of hardware. The average lapse of time between the date of the accident and the operation was 2 days. Mean duration of intubation was 11.94 days. Four out of the 16 patients presented a surgical complication necessitating a second operation; in two cases fracture reduction was incomplete, in two cases the osteosynthesis instrumentation had shifted in position, and in one case the complication was of an infectious nature.

The esophageal perforation was isolated in 10 cases, associated with a tracheal fistula in three cases, cutaneous in two cases and pleurabronchial in one case. The perforation diagnosis was confirmed in all cases by endoscopic and/or radiological explorations (fistulography, esophageal series with gastrografin, TDM, MRI) and in three cases by intraoperative examination. The mean time lapse between cervical surgery and perforation diagnosis was 8 months, and it ranged from 9 days to 3.8 years.

Treatment of the esophageal perforation was surgical in 12 cases, associated with the ablation of osteosynthesis hardware