



## PNEUMOPAROTID: A CASE REPORT AND REVIEW OF THE LITERATURE

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**ABSTRACT**

In this study, we report on the case of pneumoparotid seen in 23 year old man. This pathology is caused by the insufflation of air in acini of the parotid salivary glands, through the Stensen's excretory duct. The literature review show various etiology, but it is also seen in glass industry workers, or as a professional disease in wind instrument players, as well as in the production of glass fibers. Very often, it may occur after the auto-insufflations, especially in adolescence, when associated psychological issues complicate the situation.

The early diagnosis is set using the data from medical history and clinical presentation, completed with radiological examination. The treatment consists of knowing the etiology cause, it is often symptomatic and sometimes exclusively surgical.

**KEYWORDS** : *Pneumoparotiditis, Pneumoparotitis, Head-and-neck emphysema, surgical or anesthetic mumps*

**INTRODUCTION**

Pneumoparotid is a rare condition, defined as a presence of air in salivary ducts and/or acini in parotid gland. In literature, we found the synonyms of this condition: pneumoparotitis, pneumoparotiditis, pneumoparotid, wind parotitis, surgical or anesthetic mumps<sup>(26,27)</sup>, pneumosialadenitis, pneumatocele glandulae parotis.<sup>(31,33)</sup>

Pneumoparotid is usually represented clinically as a unilateral or bilateral swelling of the face in the parotid region<sup>(1,6,7)</sup>, (which may be painless, but if infected, it may be associated with warmth, erythema or pain. Acute and chronic forms of secondary bacterial infections may cause the recurrent episodes of pneumoparotid. Sometimes the perforation of parotid acinus may occur and cause the intraparietal air gap in parapharyngeal and retropharyngeal space, or even pneumomediastinum and/or distant pneumothorax.<sup>(3,4)</sup> The mechanism of air entrance in the Stensen's duct, and consequently the gland, is probably due to increased intraoral pressure. Other possible predisposing factors are anatomical abnormalities, striction of excretory duct, pathological process in Stensen's duct, hypotonia of the buccinator muscle or hypertrophy of muscular structures around the duct and the gland, and it can be transitory obstruction of the Stensen's duct by concentrated saliva and mucus, forming the mucous plug<sup>(1,2,3,4)</sup>. The causes of pneumoparotid can be various: in professions with danger in working (glass and balloon-blowers, wind instrument players), spontaneously during spirometry<sup>(22,23,24,25)</sup>, in dental interventions<sup>(34,37)</sup>, long and persistent cough, forced inhalation of air under the pressure, in adolescents<sup>(35,36,38)</sup> or chewing the gum.<sup>(1,8,9,11,12,13,14,39)</sup>

The clinical treatment consists of giving antibiotics in cases of bacterial infection or after the surgery with ligation or parotidectomy, in patients with recurrent episodes of disease. Considering the fact that it is a very often condition in wind instrument players, it is advisable to lower the additional insufflations of air into diseased parotid gland<sup>(29,30)</sup>, to achieve better results of treatment - Luaces et al.2008. Sometimes only surgery has a crucial role in the solution of such condition, and the fact that serious and advanced pneumoparotitis can progress and grow into subcutaneous emphysema of the face and/or neck needs to be taken into consideration, and sometimes it can furorously lead to pneumomediastinum<sup>(10,11,14,15)</sup>, spreading through parapharyngeal and retropharyngeal spaces - Gudlaugsson et al.1998. When no bacterial infection is present<sup>(20,21)</sup>, nor bacterial parotitis that produces the gas, it is assumed that it is made in the gland itself due to repeated influx of air under the pressure from the oral cavity to

Stensen's duct, associated with increased intraoral pressure.<sup>(14,15,16)</sup>  
<sup>18)</sup>ve been an even greater environmental problem.

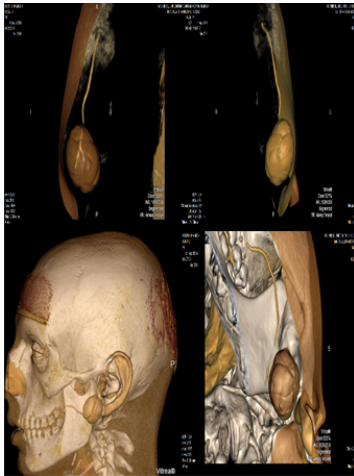
**CASE STUDY**

We report the case of 23 year old man presented with unilateral painless swelling of left parotid region, present for 2 weeks. The patient reported on strange sounds from his oral cavity followed by bubbles in saliva. During the clinical examination, no limited jaw opening nor trismus were found, no signs of crepitations or strange sounds in jaw articulations. With mild pressure on the swelling and by inspection of papilla of Stensen's excretory duct, appears scarce saliva with bubbles that point to the air presence. Besides respiratory infection with classical signs 3 weeks before, no other significant past medical or surgical histories were found. His orthopantomogram did not visualize any abnormalities, except caries of some teeth and minor parodontitis. The opacity that would show such sialolithiasis on the parotid salivary gland or its excretory duct spot was not seen. As a diagnostic procedure, the computerized tomography of head and neck showed the air presence in the enlarged left parotid gland, as well as in the left and the right Stensen's duct. No other lithiasis were associated. The diagnosis was confirmed as a pneumoparotid, from the non-complicated left acute discreet focal parotid gland.

The CECT examination was performed on Toshiba Aquilion Prime scanner using 80 ml non-ionic iodinated contrast media (Omnipaque, 370 mg/mL of iodine; Amersham Heath, Princeton, NJ, USA), IV injected at the rate of 4 mL/s via right antecubital vein, followed by 20 mL of saline at the same rate, with a 40 s scan delay. Whole non-contrast CT (NCCT) without head and neck was performed before CECT, from C3 to the vertex.

Postprocessing was performed on a VitreaCore workstation (Vital Images Inc., MN, USA).





**Figure 1. Three-dimensional sound imaging and MiniP axial images show the presence of air in the enlarged left parotid gland and in the left and right Stensen's ducts.**

## DISCUSSION

Pneumoparotid is defined as a presence of air in salivary ducts and/or acini of the parotid gland. This condition is rare. It is more likely to occur in persons who have regularly raised intraoral pressure, for example glass and balloon-blowers.<sup>(1,2,3,4)</sup> There were also registered cases of insufflations after bicycle tire inflation, whistling, nose fracture, cough and valsalva manoeuvre to clear the ears. It can also occur as an iatrogenic effect of dental treatment, spirometry, and positive pressure ventilation<sup>(3,4,5)</sup>

Other predisposing factors have been associated with anatomical abnormalities, including pathology of Stensen's duct; hypotonia of the buccinator muscle, hypertrophy of the masseter muscle and temporary obstruction of the Stensen's duct by mucosal edema.

The physiopathology of pneumoparotid is related to the increase of intrabuccal pressure overcoming the normal sealing mechanisms of the meatus of the parotid duct. For creation of the reflux of air, the anatomical gland or duct abnormalities combined with intrabuccal pressure increase need to be present.

Pneumoparotid can be clinically seen as unilateral or bilateral, painless and without inflammation, but if it turns into acute form, painful edema, associated with warmth and/or erythema can occur. The diagnosis is set using the data from medical history and clinical presentation, often completed with radiological examination. During the physical examination, crepitations occur while palpating, and massaging the gland can lead to discharge of the foamy saliva or air bubbles from Stensen's duct. To determine the diagnosis of pneumoparotitis, Ghanem et al. recommended the ultrasound instead of classical radiography, sialography or computerized tomography (CT). These authors point that the ultrasound enables the detailed examination of parotid gland in all sections and that the wall of parotid duct can be visualized as a thick layer, since the lumen of the duct shows low level of echogenicity.<sup>(3,2)</sup> Consequently, the path of parotid canal can be visualized. Ultrasound, CT or sialography will show the air in the parotid gland and/or its duct. Multi-slice computed tomography (MSCT) is still the standard examination method for diagnosing the pneumoparotid due of the better resolution, faster acquisition, objectivity and widespread availability.<sup>(41)</sup> Wider window settings (e.g., lung window) on a CECT scan gives a better delineation of a small amount of air that may sometimes be missed on typical soft tissue (brain/mediastinal) windows. The reason for this is suppression of the adjacent soft tissue by widening the window settings. Checking the bone and lung window settings is therefore essential to exclude the pneumoparotid.

This condition needs to be differentiated from other causes that

require the dedicated treatment, such as infectious (viral and bacterial), autoimmune (Sjogren's syndrome, Wegener's vasculitis), and endocrine disorders (diabetes mellitus, Cushing's syndrome, hypothyroidism); liver failure; granulomatous diseases (sarcoidosis); allergic reactions or adverse drug reactions; trauma; and ductal obstruction.

The treatment can be conservative or surgical. Conservative treatment includes massage, hydration, warm compresses, and anti-inflammatory medications and prophylactic antibiotics. Surgical intervention includes the identification of parotid duct and mechanical widening using small sized Foley's catheter to dilate the place of stricture, and catheter rests there for some period of time until recovery. Second surgical aspect of treatment is parotidectomy in patients with recurrent episodes of pneumoparotid without resolution with conservative treatment.

Pneumoparotitis is a rare cause of parotid gland enlargement; it is often misdiagnosed and therefore incorrectly treated. The literature show clinical presentation, pathogenesis, radiography and treatment aspects. We follow our results through the literature reviews on this subject. In children, the inflammatory swelling of parotid gland is usually a consequence of viral or bacterial infection, juvenile recurrent parotitis or allergic, autoimmune or systemic disease. The edema can occur if the air is suppressed through the Stensen's duct or trapped inside, which leads to pneumoparotitis. It can be manifested as transitory or recurrent phenomenon. The reproductive parotid insufflation of air is not quite benign, since it can lead to sialectasis, recurrent parotitis and sometimes to subcutaneous emphysema.

## CONCLUSIONS

Pneumoparotitis is a rare cause of parotid gland enlargement; it is often misdiagnosed and therefore incorrectly treated. No contrast multi-slice computed tomography is the reference method for positively diagnosing this condition. MRI and ultrasound may help in detecting the possible inflammatory or infectious complications of the parotid gland or subcutaneous emphysema. Frequent compressions of buccal region may be one of the bases of pneumoparotid development.

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