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Oronasal Fistula: A Complication of Cleft Palate Surgery

Manal Abdalla Ali Eltahir

Abstract

Oronasal fistula is one of the disappointing expected outcomes of cleft palate surgery. It may follow palatoplasty for palatal clefting patients, which is defined as an abnormal communication between the oral and nasal cavities. More than one system has attempted its classification. It may be a small and a symptomatic or symptomatic fistula that requires correction. Its rate differs widely according to many factors. Both surgical and non-surgical methods (the pros and cons of each should be considered) are available for its correction, and there are adjunctive therapies to assist in improving the surgical outcome.

Keywords: cleft palate, oronasal fistula, palatoplasty, complication

1. Introduction

Cleft lip and palate are among the most common birth defects in the craniofacial region [1]. The prevalence of isolated cleft palate is 1 in 2000 live births [2].

Management of children born with a cleft lip and/or palate necessitates long-term and multidisciplinary involvement and multidisciplinary to obtain the most satisfactory results [3].

In an attempt to correct such abnormality, non-surgical appliances, as well as surgical correction procedures, could be adopted for the affected individuals.

Following surgical correction, oronasal fistula constitutes the most common complication, which compromises the goal of palatoplasty [4], and is further considered (with other two additional complications, namely velopharyngeal insufficiency [VPI] and midface hypoplasia) as a metric and quality indicator [5].

In this chapter, oronasal fistula, as one of the expected deleterious outcomes of cleft palate surgery, is discussed thoroughly. Its definition, causes, classification, incidence, diagnosis, and management (both non-surgical and surgical treatment) are identified.

2. Definition

Generally, fistula refers to a communicating track between two epithelial surfaces, commonly between a hollow viscus and the skin (external fistula) or between two hollow viscera (internal fistula), lined with granulation tissue which is subsequently epithelized [6, 7]. Specifically, the nasal cavity is separated from

the oral cavity anteriorly by the premaxilla and maxilla and posteriorly by the horizontal plate of the palatine bone [8]. The oronasal fistula (ONF) is an internal fistula and represents an abnormal epithelized track communicating between the nasal cavity and mouth [7].

There are many causes of fistulas of the hard palate that involve the nasal or antral cavities, or both [9]. Moreover, it is a known complication of cleft palate repair. Most commonly, sutures within the oral mucosa break down 1 week after surgery, leaving a local fissure at the surgical site in the oral cavity. This local fissure either eventually heals well after proper treatment or develops into a channel between the oral and nasal cavity, which is called an oronasal fistula, or ONF [10].

3. Incidence

3.1 Fistula occurrence and recurrence

There is substantial variation in fistula incidence following surgical repair of cleft palate. Its occurrence is ranging widely, between 12 and 45%, as reported by Schultz in 1986 [11], and from 4–60% according to other studies. The occurrence of fistula following surgery is as high as 4–45%, which makes the cleft palate repair more challenging. Unfortunately, to date [12], there remains a wide range in frequency, which may be due to the absence of one agreed (unanimous) surgical technique, the application of different surgical techniques for cleft palate repair, the timing of the repair, the severity of the cleft and the surgeon's experience. (**Figure 1**). Moreover, the current literature on fistula rates and surgical techniques is inconsistent [13].

Practically, surgical treatment of fistulas is often complicated by high recurrence rates (up to 33%), and further aggravated by multiple scars surrounding the lesion, which lead to more complicated recalcitrant fistulas [14].

3.2 According to gender

Females' patients are more frequently seen to be affected with CP [15]. However, oronasal fistulas after cleft palate repair seem to occur more commonly in males, for unknown reasons. Moreover, site-wise, Musgrave and Bremner' found that the frequency of fistulas was significantly greater with bilateral cleft lip and palate than in unilateral cases [16].

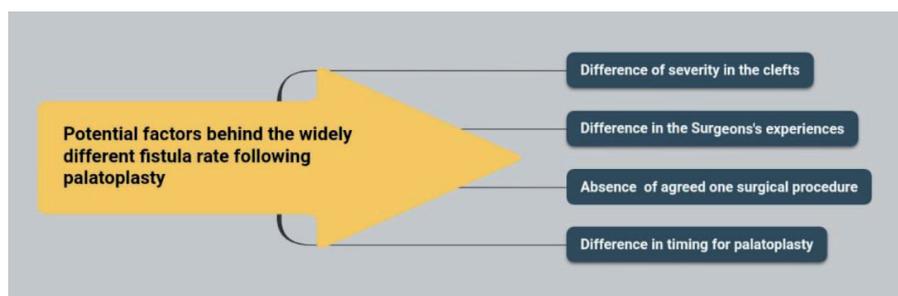


Figure 1.
Potential factors behind the wide difference in fistula rate following Palatoplasty.

3.3 According to the site

The most common sites of fistulization are the hard palate and the transition between the hard and soft palates. However, it can also occur in the soft palate [17].

3.4 According to the technique

3.4.1 According to the staged techniques

A systematic review published in 2017 by Reddy et al., showed that there was no conclusive evidence for the effects of one-stage versus two-stage palate repair on the frequency of fistulas [18]. Another study showed that there is no difference in the fistula rate in one-stage or two-stage palatoplasty [19], although recent accumulative data showed that a one-stage repair of the cleft palate is associated with a decreased risk of fistula formation compared to a two-stage repair [20].

3.4.2 According to the specific technique

Furlow's technique is reported to be less prone to postoperative fistula than von Langenbeck and Veau/Wardill/Kilner techniques [20]. Furlow's technique bases its principle on gaining length at the expense of width. Accordingly, the Furlow technique's outcome is affected by the width as the only risk factor, as reported by Li et al. [21].

4. Causes

There are many causes for oronasal fistula, but the congenital cause in cleft palate patients (primary fistula) still remains the main etiology for oronasal fistulas [10].

The causes of fistula after palatoplasty (secondary fistula) may be precipitated by one of these factors (**Figure 2**):

- Causes related to the nature of the cleft, such as the width of the cleft.
- The amount of deficiency in the palate segments, as well as the misplacement and distortion of the cleft segment [22].
- Causes related to the procedure and its sequelae, such as inadequate dissection of the flaps, closure under tension, post-operative bleeding, hematoma formation between the oral and nasal layers, and infection [23].
- Causes related to the patient [24, 25].

5. Diagnosis

5.1 Diagnostic criteria

Oronasal fistula can be diagnosed depending on the criteria in the **Figure 3** [7, 26].

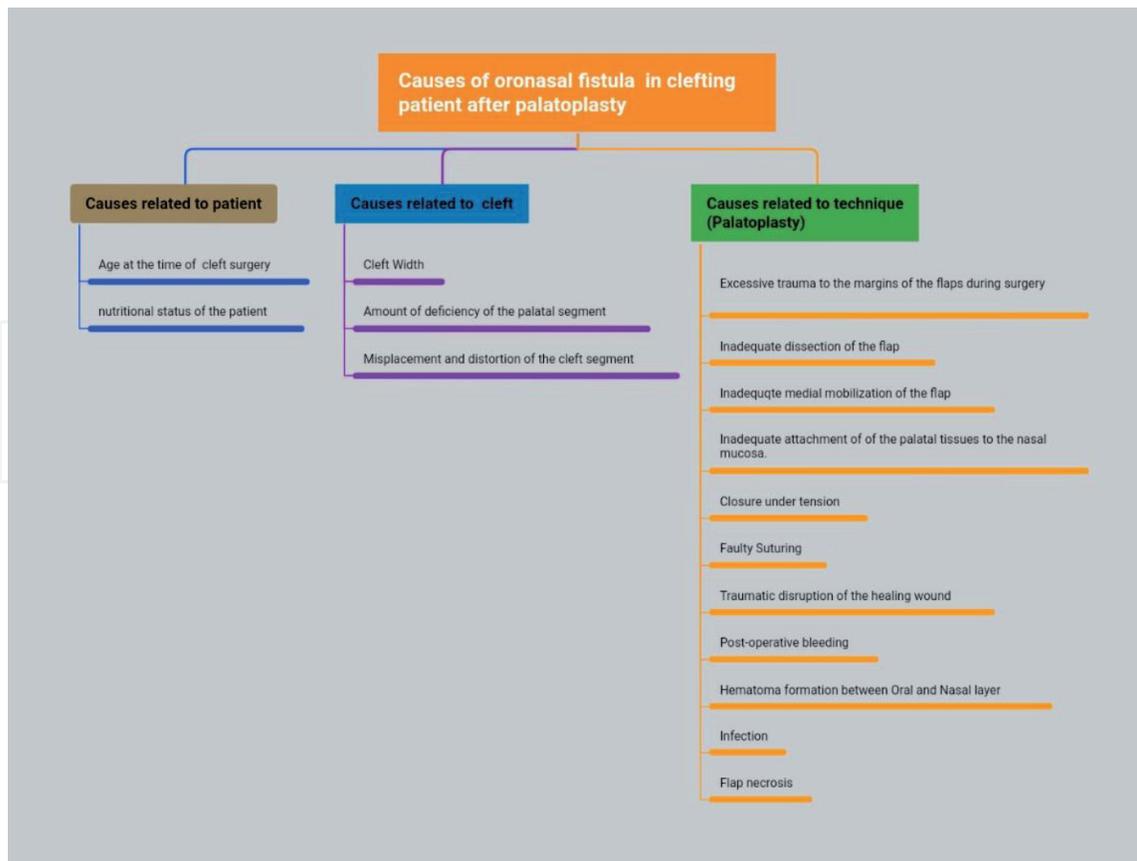


Figure 2.
Potential causes of ONF following palatoplasty.

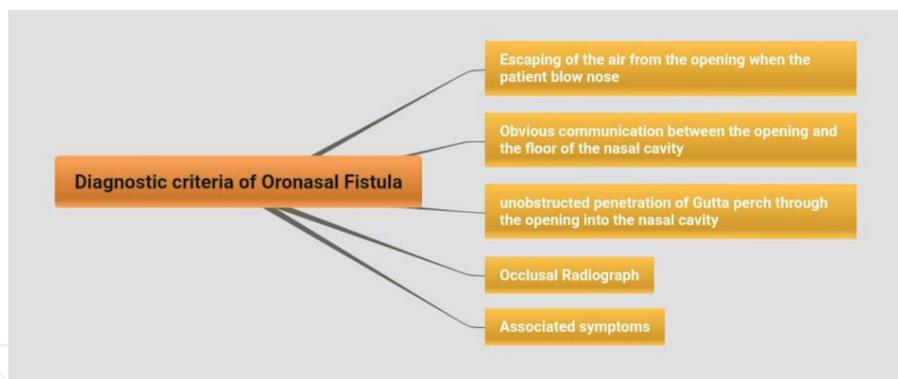


Figure 3.
Diagnostic criteria of Oronasal fistula.

5.2 Symptoms of oronasal fistula

Small palatal fistulas may not be symptomatic, so in many cases, surgical intervention is not justifiable, on the other hand, large palatal fistulas produce various symptoms [27]; These symptoms, may related to some extent to the site of the fistula, which can manifest themselves as nasality in speech, leakage of fluids into the nose, and food lodging in the defect; bad odors, bad tastes, as well as upper respiratory tract infections (**Figure 4**) [10, 23].

6. Classification

The fistula may be present anywhere along the primary or secondary palate.



Figure 4.
Oronasal fistula after palatoplasty.

Palatal fistulae either being as:

- A primary fistula associated with the clefting of the hard palate, or a
- A secondary fistula may represent a failure of surgical techniques for the correction of cleft palate [4].

Numerous classification systems have been put forth over many years. But still, there is no agreed classification, examples of such classifications are Cohen et al. (1991) classification as well as Pittsburgh Fistula classification (**Table 1**) [12, 28, 29].

Unfortunately, both of them have helped in understanding the location of the fistula apart from putting guidance for the determination of the fistula's difficulty.

Classification's Name	Classification's Parameter	Description
<i>Pittsburgh Classification</i>	Fistula's site	<ul style="list-style-type: none"> • Type I, bifid uvula. • Type II, soft palate. • Type III, junction of the soft and hard palate. • Type IV, hard palate. • Type V, junction of the primary and secondary palates (for Veau IV clefts). • Type VI, lingual alveolar. • Type VII, labial alveolar.
<i>Cohen's et al Classification</i>	Fistula's site	<ul style="list-style-type: none"> • Prealveolar • Postalveolar • Hard Palate • Soft Palate • Uvula

Table 1.
Classifications of oronasal fistula.

7. Management of the oronasal fistula

7.1 Non-surgical treatment

Fistulas can be managed by prosthetic appliances such as obturators, but there are inherent problems with this approach, such as a sharp increase in the oral bacteria count, with a resultant increase in the incidence of dental caries. Moreover, it could not be considered as a definitive treatment [30].

7.2 Surgical treatment

Simple fistulas are successfully managed by local palatal flaps, but the success of such a way is limited in management in the situation of more complex fistulas [31, 32].

Treatment of the large fistulas is usually complex and difficult to be achieved by traditional local flaps. Accordingly, extensive palatal surgery and dissection are recommended.

Secondary repair of oronasal fistula (repair of the fistula many times) is one of the more challenging and difficult problems in the field of oral and maxillofacial.

Surgical closure can be fulfilled by more than one option such as; local flap, regional intraoral and extraoral flaps as well as a free flap [33].

7.2.1 Techniques used for correction of recurred (recalcitrant) fistula

Repeated attempts for the fistula closure followed by failure, may end up by local tissue scarring.

Alternative methods of the traditional local flap are reported in the literature:

- Tongue flap, Guerrero-Santos, and Altamirano (1966) was first described the suitability of an anteriorly based dorsal tongue flap for repair of palatal fistulae [34], it can be attempted when other methods are not feasible, now it become widely accepted for the correction of the fistula following the failure of palatoplasty especially for the fistula with large size [23, 35, 36] it is a two-staged procedure and can be anteriorly or posteriorly depending on the fistula site with high success rate for the anterior fistulas [37].
- The use of decellularized dermal grafting (Alloderm) in persistent oro-nasal fistulas is also reported in the literature [38].

Other surgical techniques that have been described include free flaps, tissue expansion, interposition grafts of (bone, free periosteum, or dermis-fat) [15].

8. Adjunctive therapy

In the literature, there is more than one adjunctive therapy to improve the surgical outcome, in oronasal fistula, such as

1. Antibiotic therapy [39]
2. A resorbable collagen membrane (inter-positional barrier [40] to be an adjunct to standard surgical care, with the objective of improving the stability of the soft tissue and decreasing the incidence of new dehiscence [14].

3. PDS, polydioxanone sheet, is a synthetic polyether-ester, which is an unstable biodegradable polymer [41].
4. Plasma rich in growth factors (PRGF) mixed with autologous bone graft [42]
5. Topical phenytoin 2% (for promotion of healing) [43].

9. Conclusion

Oronasal fistula is one of the great challenges in an oral and maxillofacial specialty, there is no conclusive evidence have determined its actual rate and there are wide ranges for its occurrence and no agreement on which procedure is being the most superior, with the low rate of fistula formation following palatoplasty. Both old literature and the recent one could not put a consensus to unifying terminology in the context of definition and classification for further reliable diagnosis in an attempt to find a more accepted, predictable outcome for preventing its occurrence and find optimal managing of recurrent ONF in cleft palate patients.

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Acronyms and Abbreviations

CP	Cleft Palate
ONF	Oro nasal fistula
VPI	Velopharyngeal Insufficiency
PRGF	Plasma rich in growth factors
PDS	polydioxanone sheet

Appendices and Nomenclature

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Author details

Manal Abdalla Ali Eltahir

Department of Maxillofacial Surgery and Diagnostic sciences, College of Dentistry, Qassim University, Qassim, Saudi Arabia

*Address all correspondence to: manltahir@yahoo.com

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