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RISK FACTORS, PREVALENCE, AND SURGICAL OUTCOMES OF PALATAL FISTULAS: A GLOBAL AND PAKISTANI PERSPECTIVE

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ABSTRACT

Palatal fistulas are a common complication after palatoplasty. Factors such as age, nutritional status, and various other factors can influence the risk of fistula formation. These fistulas can lead to complications such as nasal regurgitation and speech disorders, affecting the quality of life for patients. Causes and risk factors include surgical techniques, patient demographics, and the severity of the cleft. Hence the objective of this study is to examine the prevalence, recurrence rates and associated risk factors of palatal fistula, The incidence of palatal fistulas varies globally, with global rates ranging from 10% to 30%. In Pakistan, the incidence is approximately 9.6%, highlighting the need for improved surgical techniques and postoperative care. Several factors also come into consideration including; the health of the patient, timing of the repair and experience of the surgeon. Moreover, patients of younger age with severe clefts may be more vulnerable to develop complications; this is because of issues such as tissue blood supply and the ability of the facial tissues to heal. Risk factors for palatal fistula and prevalence and recurrence rates of palatal fistula according to the literature from the world are provided in this review, Understanding the success rates and complications associated with various surgical and non- surgical methods is essential for improving patient outcomes. Further research into the existing knowledge of palatal fistula is essential for reducing recurrence rates and improving the quality of life for those impacted by palatal fistulas.

Keywords: *Palatal Fistula, Prevalence, Recurrence, Surgeon, Surgery*

INTRODUCTION

Palatal fistulas are one of the common complications after cleft palate repair, with recurrence rates varying significantly on surgical techniques and patient related factors (Gulati, Yadav, & Sharma, 2023). A palatal fistula is defined as the failure of the initial surgical closure of the palate with an open communication between the oral and nasal cavities. This condition can significantly impact the quality of life of a patient; complications include nasal regurgitation and speech disorders. This condition may occur due to poor healing at the site of surgery leading to formation of a fistula through the tissue that was intended to separate these two cavities. A palatal fistula may substantially impact the functional and aesthetic results in patients with cleft palates

(Ahmed, Maganzini, Marantz, & Rousso, 2015). Thus, Palatal fistula, also known as oronasal fistula (Chen, Yang, Yin, Shi, & Huang, 2023), is elucidated as an abnormal connection between the oral cavity and the nasal cavity that persists after surgical repair of the cleft palate. A comprehensive review highlighted that oronasal fistulae pose significant challenges across various healthcare settings, necessitating ongoing research into prevention and management strategies. Treatment of oronasal fistula remains a challenging problem as there is not a consensus in the available literature on the best palatoplasty techniques for their prevention and treatment (Buller et al., 2023).

This review examines the incidence/prevalence of palatal fistulas, risk factors associated with it, the methods used for their repair, and how recurrence may be influenced by surgical techniques and other factors.

Literature Review:

Background of Palatal Fistula

Palatal fistulae are common in cleft palate patients, where the integrity of the palatal repair is compromised. The incidence of these fistulae varies widely in the literature, with rates reported between 0% and 58%, influenced by factors such as the severity of the cleft, surgical technique employed, and postoperative stress on the wound site (Buller et al., 2023).

Prevalence and Recurrence of Palatal Fistula

The global prevalence rates and the regional data differ due to differences in surgical procedures, patients' characteristics, and availability of health care services. Palatal fistulas are common after cleft palate operations, and the overall rate of occurrence ranges from 10% to 30%; however, studies have shown specific rates based on the technique used and the patient population (Lebhar, Goza, Humphries, & Hoppe, 2022). A specific study indicated that the prevalence of maxillary ischemic complications, which can lead to fistula formation, is around 1% following certain surgical procedures like the Le Fort I osteotomy (Nezafati & Pourlak, 2023). A retrospective analysis from a specific institution reported a 9.6% incidence of palatal fistula formation among patients operated for cleft palate over a ten-year period (Garg, Shah, Uppal, & Mittal, 2019).

A multicenter trial in the UK revealed that the incidence of postoperative fistulae rises with the cleft size, emphasizing the complexity of cases and the need for tailored surgical approaches (Alex Davies et al., 2024). In Pakistan, specific information on palatal fistula is scarce; however, the data presented here can be assumed to reflect the tendencies characteristic of other countries in the region. A local institute based study revealed that the rate of palatal fistula formation was 9.6% which is comparable to international statistics and which underlines the need for enhancing the methodology of surgery as well as postoperative management to decrease the risk of developing this complication (Garg et al., 2019). Possible reasons for a relatively high rate of fistula formation in Pakistan may be attributed to differences in surgical skill, availability of sophisticated equipment, and patients' characteristics compared to developed countries. **Table 1** represents the prevalence/recurrence of palatal fistula across the world. It also includes various other factors like type and year of study and number of patients included in the study.

Table 1: Prevalence/Incidence across the world

Sr. No	Reference	Country	Institute	Study design	Duration	Sample size	Incidence/ Prevalence
1	Ishaq et. Al. (Ishaq & Fayyaz, 2013)	Pakistan	Services Hospital Lahore	Descriptive case series	2010-2011	40	In one year span, 40 patients were observed to have recurrent palatal fistula.
2	Tezuka et.al. (Tezuka et al., 2022)	Japan	--	Retrospective cohort study	2021	31	The fistula recurrence rate in the hinge-flap group

							(0%) was significantly lower than that in the sliding-flap group (30.0%) (p=0.027).
3	Shankar et.al. (Shankar, Snyder-Warwick, Skolnick, Woo, & Patel, 2018)	India	--	Review	2006-15	79	Early fistula incidence rate of 20% (n = 15) and a late fistula rate of 55% (n=42). Fistulae recurred after initial repair in 43% of cases.
4	Kurian et.al. (Kurian, Radder, & Desai, 2024)	India	SDM College of Dental Sciences and Hospital, Dharwad	Retro-prospective	2017-2020	8	The fistula was located mostly at the anterior palatal region (50%) and secondly at the mid palatal region (38%).
5	Mahajan et.al.(Mahajan, Kaur, Singh, & Kumar, 2018)	India	Amandeep Hospital, Amritsar, Punjab, India	Retrospective	2004-16	2060	Incidence of palatal fistula = 7.427%
6	Greg et.al. (Garg et al., 2019)	India	Dayanand Medical College And Hospital, Ludhiana, Punjab	Retrospective	2007-17	22	Incidence of palatal fistula = 9.6%, recurrence 18.2%
7	Jeong et.al (Ha et al., 2020)	South Korea	Seoul National University Children's Hospital	Retrospective cohort study	2015-2018	244	Fistula rate was 3.6%
8	Syaharani (Syaharani, Oetomo, Fadiyah, Danudiningrat, & Sumarta, 2024)	Indonesia	Airlangga University	Retrospective	2013-22	113	From 113 patients, 20 cases (17.7%) developed palatal fistula
9	Mapar et. al. (Mapar et al., 2019)	Iran	Isfahan Cleft Care Team (Icct)	Retrospective	2011-2014	40	The frequency of fistulas was 7.5%.
10	Park et. al, (Park, Seo, & Bae, 2022)	South Korea	Pusan National University Hospital,	Retrospective	1996-2020	636	The incidence of palatal fistula was 3.1%

			Busan, Korea				
11	Aslam et.al. (Aslam, Ishaq, Malik, & Fayyaz, 2015)	Pakistan	Services Hospital, Lahore,	Case series	2013	90	5 patients (5.6%) had fistulae formation
12	Hosseinabad et. al. (Hosseinabad et al., 2015)	Iran	Isfahan Cleft Care Team	Retrospective	2004-2009	131	A post-surgical fistula was present in 23.7%

Importance of Understanding Recurrence Rates

Knowledge of recurrence rates helps clinicians choose appropriate surgical techniques and postoperative care plans. For example, some of the methods such as buccal fat pad technique have been proved to have a lower recurrence rate than the others (Oliva, Lorusso, Scarano, D'Amario, & Murmura, 2024). Increased recurrence rates means that the patients require more attention in terms of follow up care and other operations. Knowledge of these rates allows for efficient distribution of resources in the treatment of complications related to palatal fistulas (Fayyaz et al., 2019). Monitoring recurrence rates helps in determining the relation and result of different surgeries that in turn assists in directing future studies and developmental work on new treatment plans. For example, it has been observed that some flap techniques may provide improved closure outcomes compared to others (Abdaly, Omranyfard, Ardekany, & Babaei, 2015). Palatal fistulas can create a tension on the surgical site. The recurrence rates are high for it as a research shows that the rate of recurrence may be as high upto 43% after primary attempts at repair have been made (Shankar et al., 2018). This high rate of recurrence makes the management of such patients challenging and may result in more surgeries, longer periods of recovery, and higher costs of medical care.

The underlying causes of recurrence often relate to the complexity of the tissue involved and the surgical techniques employed. For instance, poor palatal wound healing can lead to oronasal fistulas, which significantly affect a patient's velopharyngeal function and overall quality of life (Chen et al., 2023). Moreover, specific patient characteristics, such as the presence of bilateral clefts or a history of early fistula repairs, have been associated with higher rates of late fistula incidence (Shankar et al., 2018). So, understanding the underlying causes of recurrence can help to develop preventive strategies in future.

Risk Factors for Palatal Fistula Development and Recurrence

The recurrence of palatal fistulas can be linked to factors like surgical technique, patient's health, timing of repair and many more. Such factors are discussed to get a better understanding on palatal fistula recurrence.

Surgical Technique

Several approaches are used in the operation to close the palatal fistulae depending on the region affects the results. For instance, the buccal fat pad technique has been preferred in India for larger defects because of its success rate. A comparative analysis of the results showed that the application of this method is accompanied by lower recurrent rates compared to flap techniques used in western countries (Kantorowicz, 1990).

The technique used has a big influence on the recurrence rates. Various surgical approaches may greatly affect the formation of the palatal fistula. For example, Sommerlad and Furlow palatoplasty (SFP) has been found to increase the length of the palatal fistula and also reconstruct the Levator Veli Palatini sling, which is a crucial structure in the velopharyngeal mechanism. An evaluation of potential risk factors for velopharyngeal insufficiency and palatal fistula after SFP revealed that the technique is safe; however fistulas are directly related to the type of cleft being closed. This suggests that there are particular surgical techniques that are preferable for particular cleft types to avoid fistula dangers (Dou, Huang, Cheng, Li, & Shi, 2024).

Knee joint mobilization techniques that minimize the stress on the suture line yield a lower fistula formation. The Furlow technique is more complex than the other techniques, and hence, it has higher incidences due to technical reasons. Compared to other techniques such as the Busan modification, this technique has a higher recurrence rate of 12.1% because of the technique's complexity and tension at the suture line (Park et al., 2022). Two-Flap Palatoplasty method has been refined to achieve less tension during suturing that is very important in avoiding fistula. Other changes like the anterior triangular flaps have been made to improve flap movement and reduce tension at the suture line (Farouk & Abouarab, 2022). Tongue Flap is especially useful in cases of big or repeated palatal fistulas and it uses the tongue's arterial blood supply and flexibility. Research shows that flap closure is successful in all patients who undergo tongue flap surgery with few adverse effects (Prakash et al., 2018). A two-stage labial flap method with a labial flap has been reported for the repair of anterior palatal fistulas, which has good outcomes, but it must be noted that postoperative care should be taken to prevent dehiscence (Lebhar et al., 2022). Flap-based repairs generally depend on the design and blood supply of flap used in the particular repair. Specific approaches to flap mobilization and flap vascularization can improve flap survival and minimize flap contracture (Prakash et al., 2018).

Timing of Repair

Another factor that greatly influences post-operative results is the age at which cleft palate surgery is conducted. A study shows that surgeries done on patients who are less than six months old are likely to cause complications such as formation of fistulas. The large-scale investigation showed that younger patients faced higher readmission and reoperation rates than older patients, which means that there is a relative contraindication for early repair in infants. This finding emphasizes the importance of timing in surgical planning to reduce complication rates (Zubovic & Patel, 2021). It has been established that lower age at the time of repair is associated with higher odds of fistula formation, especially in syndromic patients where there may be an increased number of associated factors that may hinder healing (Landheer, Breugem, & Van Der Molen, 2010).

Surgeon's Experience

Another important determinant of palatal fistulas is surgeon experience. However, even in the best of hands a fistula may develop in the palate following operative repair. Palatal fistula closure is a challenging procedure. The problem arises from lack of healthy tissue for sufficient tension-free closure as it is observed in other organs (Richardson & Agni, 2014).

It is the case because a number of factors may contribute to the success of an operation; more experienced surgeons are likely to use a variety of procedures and controls complications well than junior surgeons. A systematic review of literature on evidence-based practices in cleft palate surgery highlighted that surgeon skill and experience bear a direct relationship with the reduction in the risk of complication such as oronasal fistulas. With increased surgeon experience, there is expected enhancement of operative skills and therefore enhanced patient outcomes (Applebaum, Aronson, Termanini, & Gosain, 2024). Even the most skilled surgeons cannot completely remove the risk of fistula formation, especially in the hard palate, but their expertise plays a crucial role in improving patient outcomes. Surgeons with extensive experience are more adept at managing complications and utilizing various techniques that can minimize the chances of oronasal fistulas.

Post-operative Care and Complications

Postoperative care significantly affects the rate of complications associated with palatal fistula. In regions with robust healthcare systems, such as North America and parts of Europe, follow-up care includes regular monitoring and early intervention for complications. This proactive approach has been linked to lower rates of fistula recurrence (Amy Davies, Deacon, Cobb, McLean, & David, 2022).

In contrast, areas with limited healthcare resources may experience higher complication rates due to inadequate postoperative follow-up. For instance, a study from rural South America noted that lack of access to specialized care resulted in a significant number of patients developing secondary complications related to untreated

palatal fistulae (Kantorowicz, 1990). Postoperative management is crucial in preventing recurrence. Factors such as adherence to follow-up appointments, management of oral hygiene, and avoidance of trauma to the surgical site are essential for successful outcomes.

Patient-Related Factors

Palatal fistulas are a significant complication following palatoplasty, particularly in patients with cleft palates. Understanding the demographics and associated risk factors is crucial for improving surgical outcomes. Key demographic factors include age at initial repair, nutritional status, and the presence of co-morbid conditions.

Age, preoperative cleft severity (as classified by the Veau system), and compliance with postoperative care also play critical roles in outcomes. Younger patients or those with extensive clefts may be at higher risk for complications due to factors like tissue viability and healing capacity (Park et al., 2022).

The age at which a patient undergoes palatoplasty is an important determinant to the occurrence of a palatal fistula. Research shows that fistula development is more common in patients below the age of five years. For example, a study pointed out that the best time to perform the surgery is at 1.285 years and early surgery may lead to fewer complications (Dou et al., 2024). Furthermore, another study also confirmed that fistula development directly increases with age, especially in young patients, therefore necessitating consideration of surgical timing in children (Aldaghir, AlQuisi, & Aljumaily, 2019). A study examining the results of cleft palate surgeries determined that the best age for conducting palatoplasty is approximately 1.285 years. Addressing this issue early greatly lowers the chances of complications, such as the development of fistulas. Children who had surgery before the age of five showed a greater occurrence of fistulas, highlighting the significance of timing in surgical procedures for young patients (Dou et al., 2024). Another investigation into the relationship between surgical age and fistula development confirmed that younger patients are at increased risk for fistula formation. This suggests that careful consideration must be given to the timing of surgical intervention to mitigate risks associated with palatal repair (Smyth & Wu, 2019). Future research should continue to explore these relationships to enhance surgical strategies and improve patient outcomes.

Nutritional status is a critical determinant of surgical outcomes and the incidence of complications such as palatal fistulas. Poor nutrition may also cause poor wound healing and increased risk of infections hence development of a fistula. One systematic review pointed out that the surgical patients require appropriate nutritional support during the preoperative and postoperative periods to reduce fistula-related complications (Aldaghir et al., 2019). A comprehensive analysis revealed that insufficient nutritional support prior to and following surgery can result in poor wound healing and a greater risk of infections, both of which are factors that elevate the likelihood of fistula formation. The review highlighted the importance of nutritional assessment and intervention in both preoperative and postoperative care (Dudzic, Płatkowski, & Folwarski, 2023).

Nutritional status plays a pivotal role in surgical recovery and the risk of complications such as palatal fistulas. Malnutrition can impair wound healing and increase susceptibility to infections, both of which contribute to fistula development. A systematic review noted that adequate nutritional support pre- and post-surgery is essential for minimizing complications, including fistula recurrence. Additionally, the presence of other anatomical or functional abnormalities can complicate the surgical technique and increase the likelihood of fistula formation (Aldaghir et al., 2019). Malnutrition can hinder healing processes, which raises the risk of complications like palatal fistulas. Providing patients with the right nutritional support can greatly lower these risks and enhance overall surgical results (Peyvasteh, Askarpour, Moradi, & Mansouri, 2023).

The probability of developing fistula or fistula recurrence in patients with cleft palate depends on the type of cleft: complete, incomplete, syndromic, and nonsyndromic. These differences are important for prognosis and the determination of the particular course of treatment. Patients with complete clefts generally exhibit a higher risk of postoperative complications, including fistula formation, compared to those with incomplete clefts. This is attributed to the greater extent of

tissue disruption and the complexity involved in surgical repair. A study found that only patients with Veau cleft types 3 and 4 (which typically represent complete clefts) developed postoperative fistulas, indicating a direct correlation between the severity of the cleft and the likelihood of complications (Zietsman et al., 2021).

Syndromic clefts are associated with a higher incidence of fistula formation compared to non-syndromic clefts. This increased risk is often due to additional anatomical and physiological challenges presented by associated syndromes. In a retrospective analysis, it was noted that syndromic patients had a significantly higher incidence of fistulas post-repair, highlighting the need for careful preoperative assessment and planning in this population (Landheer et al., 2010). Recognizing these risk factors is essential for refining surgical strategies, improving patient outcomes, and guiding future research to develop targeted approaches for managing fistula risks in cleft palate patients.

Risk Factors Associated with Cleft Types

The width of the cleft plays a critical role in determining the risk of fistula formation. Wider clefts are more likely to lead to complications post-surgery. A study indicated that a greater cleft width (≥13 mm) was an independent predictor for fistula development, particularly in two-stage repair procedures (Landheer et al., 2010). A study conducted at a tertiary care center reported a prevalence rate of 27% for palatal fistulas among 589 patients who underwent palate repair. Most of these fistulas were in the anterior region, accounting for 37.11% of cases. Significant associations were found between fistula occurrence and factors such as initial cleft width and intraoperative complications ($p \leq 0.05$) (De Agostino Biella Passos, de Carvalho Carrara, da Silva Dalben, Costa, & Gomide, 2014).

The choice of surgical technique also interacts with cleft type to influence outcomes. Techniques such as two-flap palatoplasty have been associated with higher rates of fistula formation compared to one-stage repairs, especially in patients with more severe cleft types (Vityadewi & Bangun, 2013). This suggests that both the anatomical complexity associated with complete or syndromic clefts and the surgical approach used can significantly affect postoperative outcomes. Understanding the genetic predispositions and environmental influences that contribute to the likelihood of developing palatal fistulae is crucial for improving surgical techniques and patient care.

Research indicates that genetic factors play a role in the morphology of palatal rugae, which may correlate with the risk of palatal fistula formation. A study examining families in Western India found a significant heritable component in the patterns of palatal rugae between parents and their offspring, suggesting that genetic predispositions could influence the structural integrity of the palate and its susceptibility to complications post-surgery. The study reported a weak but significant correlation in rugae patterns, indicating that both genetic and environmental factors contribute to their development ($P < 0.05$) (Bhatnagar et al., 2024).

Environmental factors, particularly those related to surgical technique, have been shown to significantly impact the incidence of palatal fistulae. A retrospective analysis of cleft palate repairs indicated that the experience level of the surgeon was a critical factor; fistula rates were notably higher when surgeries were performed by less experienced attending doctors compared to senior surgeons (14.29% vs. 3.03%, $P < 0.05$) (Wu et al., 2020). Improved understanding of these factors can guide tailored surgical strategies and enhance patient care, particularly for those with complex cleft types. **Table 2** represents the association of number of surgical procedures done with the recurrence of palatal fistula. It was presented by Sunil (Richardson & Agni, 2014) and his study further introduced a new classification and difficulty index for management of palatal fistulae. It also emphasized the use of the difficulty index to pre-operatively judge the success of the procedures.

Table 2: Distribution of Palatal fistulae according to number of procedures adopted by (Richardson & Agni, 2014).

Items	Hard palate	Soft palate	Recurrence
Longitudinal	429	03	-
Only palatoplasty	215	03	7(3.21%)
Fistula operated once	183	0	20 (10.93%)
Fistula operated more than once	31	0	07(22.58%)
Total recurrence	34	0	34 (7.87%)
Transverse	174	04	-
Only palatoplasty	89	02	11 (12.09%)
Fistula operated once	62	02	11 (17.19%)
Fistula operated more than once	23	0	13(56.52%)
Total recurrence	34	01	35(19.66%)

Discussion:

Despite improved technique of repair of cleft palate, fistula occurrence is still a possibility either due to an error in surgical technique or due to poor tissue quality of the patient. The incidence of palatal fistulas is more common in bilateral cases than unilateral ones (Mahajan et al., 2018).

Studies report varying incidence rates of palatal fistulas post-repair. For instance, a retrospective analysis of 636 cleft palate repairs indicated a fistula occurrence rate of 3.1%, with the majority located in the hard palate (Park et al., 2022). Conversely, some reports suggest rates as high as 10% to 30% in certain populations, particularly for anterior palatal fistulas (Lebhar et al., 2022).

The development of a palatal fistula can lead to several complications, including difficulties in speech, feeding challenges, and increased risk of dental issues. The functional impact of these fistulae is profound, as they can hinder normal oral-nasal separation necessary for proper speech production (Selim, Khalifa, Ibrahim, & Serag, 2023).

Variations in incidence rates across studies suggest a multifactorial nature, influenced by factors such as surgical technique, patient-specific tissue quality, and case complexity. Enhancing surgical precision and addressing patient-specific factors may help reduce the incidence and impact of this complication, ultimately improving quality of life for affected individual.

The formation of palatal fistulas can be documented to various factors, that includes surgical techniques as specific surgical methods may have higher rates of fistula formation, patient demographics like age and sex may influence outcomes post-surgery, severity of the cleft can also affect the likelihood of developing a fistula after repair (Phillips et al., 2024). The incidence of fistula depends on the severity of the primary defect, the technique used for repair and the tension applied over the wound. Different methods are described for palatal fistula repair, starting from local mucoperiosteal flaps to free flaps. The recurrence rate of fistula after primary repair is about 23%, on the other hand the recurrence rate of fistula after its repair is higher as 25-33% up to 100% (Emara, Makeen, & AboulHassan, 2020).

Clinical Significance and Impact

The effects of palatal fistula are not only localized to the oral cavity but affect almost all spheres of the patient's life. Patients who have palatal fistulas are usually seen to have Velopharyngeal Insufficiency (VPI) which is a condition where the soft palate cannot close well against the back of the throat during utterance of words. This may result in hyper nasal speech and problem with articulation and may therefore require further management (Siriwiroj et al., 2024). The described anomalous union can lead to the penetration of food and liquids into the nasal cavity and aspiration pneumonia and other respiratory diseases. This is especially the case for young children with a tendency to develop swallowing issues (Gebremariyam, Eshete, & Baraki, 2024). The quality of life of people with fistula is compromised due to social isolation, depression, difficulty in speaking and eating (Yuan et al., 2016).

In cleft care, it is mandatory to treat palatal fistulas because they are an indication of a failed surgical

practice. Some authors reported an incidence of palatal fistula up to 25% after primary palatoplasty procedures. This paper has also established that factors like the width of the cleft and the type of surgery performed greatly influence the occurrence of a fistula. For example, it has been established that patients with wider clefts are likely to develop fistula hence the need to adapt the surgical procedures applied (Gulati et al., 2023).

Knowledge of the incidence, recurrence rates and risk factors for palatal fistula is important in enhancing patient care for patients with cleft palate. Palatal fistulas are one of the most frequently noted postoperative problems in patients with cleft palate, and the frequency ranges from 3% to 58% (Park et al., 2022). The recurrence rate of palatal fistulas after repair can also be significant, ranging from 25% to 60% (Wang, Yang, Liu, Fan, & Lu, 2023). Such variability serves to emphasize the need to understand the antecedents of such outcomes in order to address them.

The high prevalence and recurrence rates of palatal fistulas can lead to multiple complications for patients. Patients may experience difficulties with speech, swallowing, and nasal regurgitation of food, which can significantly impact their quality of life. The presence of a palatal fistula can lead to psychological distress due to social stigma or embarrassment related to speech and eating difficulties (Wang et al., 2023). Recurring fistulas necessitate additional surgical interventions, which not only increase healthcare costs but also prolong recovery times and disrupt the continuity of care (Buller et al., 2023).

General Outcomes and Complications

Children with palatal fistulas therefore may have problems feeding because of poor seal in their mouth, which may result to regurgitation of foods and liquids through the nose. This may also make feeding difficult and may require the use of special feeding equipment's or feeding procedures (Ysunza, Pamplona, & Repetto, 2015). Fistulas and other anatomical changes that accompany cleft palates are capable of impairing middle ear function and result in conductive hearing loss. This is often because of Eustachian tube dysfunction, which is more frequent in children with cleft conditions (Foroglou, Tsimponis, Goula, & Demiri, 2015).

Another effect that palatal fistulas have on the patient is speech disorder. A fistula can interfere with the function of the velopharyngeal sphincter which is required for speech process. This disruption usually leads to nasal escape (air escaping through the nose during speech) and thereby, hypernasality and articulation difficulties (Ysunza et al., 2015). Palatal fistulas in children cause speech problems and may warrant speech therapy to correct these problems in the child (Foroglou et al., 2015).

The aesthetic consequences of cleft lip and palate such as palatal fistulas can cause considerable psychosocial problems. This leads to social prejudice, low self-esteem, and interpersonal relationship problems which may cause mental health problems. The previous research has indicated that children with palatal fistulas have a lower quality of life in terms of oral health. This can involve perceived problems in the ease or ability to eat, speak, and general satisfaction with oral health status. A fistula is associated with worse self-perceived speech and higher levels of disability (Long, Wilson-Genderson, Grayson, Flores, & Broder, 2016). The challenges of handling palatal fistulas are usually for a lifetime, and this will need specialized medical attention, and sometimes surgeries and other forms of treatment. This can put a significant financial strain on families because of often visits to doctors and possible further operations for the correction.

Identification of Risk Factors

Identifying risk factors associated with palatal fistula development is essential for tailoring preventive strategies. Different surgical methods yield varying rates of fistula formation. For instance, techniques like the Furlow double-opposing Z-plasty have been associated with higher rates compared to other methods (Park et al., 2022). The severity of the cleft has been shown to correlate with the likelihood of developing a fistula. More extensive clefts often result in more complex repairs that may predispose patients to complications (Buller et al., 2023). The skill level and experience of the surgeon performing the repair can significantly affect outcomes. Continuity of care is also critical; patients managed

by a single surgical team tend to have better outcomes than those treated by multiple teams (Wang et al., 2023) (Buller et al., 2023). By addressing these factors, healthcare providers can minimize the incidence of palatal fistula, improve patient outcomes, and enhance the overall effectiveness of cleft care.

In general, palatal fistulas are important morbidities associated with cleft palate surgery that should be well addressed to enhance the quality of life of the affected patients. Their prevention and treatment continue to be important parts of total cleft care interventions. The occurrence of palatal fistulas is not uniform worldwide, and has important consequences for surgery and the patients. The incidence of these complications is not dissimilar to that observed in other countries; however, Pakistan specifically requires improved surgical methods and postoperative care (Wang et al., 2023) . Further study and better education of practitioners are the key to solving this problem. Treatment of recurrence in palatal fistula is important for the patient's recovery and future health and for the overall health of the population as a whole. The extension of the evaluation process of treatment methods and their corresponding recurrence rates will help improve management and treatment approaches to patients (Erdenetsogt, Ayanga, Tserendulam, & Bayasgalan, 2015). It is therefore important to comprehend how these methods work, the success rates, and complications that are involved with these methods so as to enhance the patients results.

Hence, whether the cleft is complete or incomplete, syndromic or non-syndromic; significantly determines the likelihood of fistula formation and surgical recurrence. Other aspects include cleft width, the type of surgery, and the age of the patient that help to influence this risk (Yuan et al., 2016). A good appreciation of these variables is crucial in achieving the best results for the surgeries and at the same time reducing the adverse effects in patients with cleft palate. Heredity and environmental factors play a major role in determining the tendency of patients to develop palatal fistulae after cleft palate surgery (Lam, Chiu, Sie, & Perkins, 2012). There is need for further research in the genetic predisposition to palatal morphology and the environmental issues that include the surgical procedure and the operator. Knowledge of these factors may help in designing enhanced measures to prevent as well as treat palatal fistulae.

Future Insights:

A comprehensive understanding of the prevalence, recurrence rates, and risk factors associated with palatal fistulas is vital for optimizing surgical outcomes in cleft palate repair. This knowledge not only enhances patient care but also supports healthcare systems in managing resources effectively while improving overall patient satisfaction and quality of life. Minimizing the risk of palatal fistulas involves careful consideration of surgical techniques tailored to individual cleft types, appropriate timing for repairs, and ensuring that surgeries are performed by experienced surgeons who can navigate potential complications effectively.

In summary, while traditional surgical methods remain prevalent, innovative techniques and biological adjuncts emerging as significant contributors to improving success rates and minimizing complications in palatal fistula repairs. Continued research and clinical practice will help refine these approaches further.

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REFERENCES

Abdaly, H., Omranyfard, M., Ardekany, M. R., & Babaei, K. (2015). Buccinator flap as a method for palatal fistula and VPI management. *Advanced biomedical research*, *4*(1), 135. doi: https://doi.org/10.4103/2277-9175.161529

Ahmed, M. K., Maganzini, A. L., Marantz, P. R., & Rousso, J. J. (2015). Risk of persistent palatal fistula in patients with cleft palate. *JAMA Facial Plastic Surgery*, *17*(2), 126-130. doi: https://doi.org/10.1001/jamafacial.2014.1436

Aldaghir, O. M., AlQuisi, A. F., & Aljumaily, H. A. (2019). Risk factors for fistula development following palatoplasty. *Journal of Craniofacial Surgery*, *30*(8), e694-e696. doi: 10.1097/SCS.0000000000005635

Applebaum, S. A., Aronson, S., Termanini, K. M., & Gosain, A. K. (2024). Evidence-Based Practices in Cleft Palate Surgery. *Plastic and reconstructive surgery*, *153*(2), 448e-461e. doi: 10.1097/PRS.0000000000011035

Aslam, M., Ishaq, I., Malik, S., & Fayyaz, G. Q. (2015). Frequency of oronasal fistulae in complete cleft palate repair. *J Coll Physicians Surg Pak*, *25*(1), 46-49.

Bhatnagar, A., Arya, S., Kumar, J. S., Arya, A., Morya, K. C., & Baroopal, S. (2024). The Determination of Heritability in palatal Rugae Pattern among Parents and their Off-Springs in Western India–A Cross-sectional Study. *Journal of Forensic Science and Medicine*, *10*(1), 42-46. doi: 10.4103/jfsm.jfsm_121_22

Buller, M., Jodeh, D., Qamar, F., Wright, J. M., Halsey, J. N., & Rottgers, S. A. (2023). Cleft Palate Fistula: A Review. *Eplasty*, *23*, e7. doi; PMC9912053

Chen, J., Yang, R., Yin, J., Shi, B., & Huang, H. (2023). Current insights in the preclinical study of palatal wound healing and oronasal fistula after cleft palate repair. *Frontiers in Cell and Developmental Biology*, *11*, 1271014.

Davies, A., Davies, A., Main, B., Wren, Y., Deacon, S., Cobb, A., . . . Chummun, S. (2024). Association of Perioperative Antibiotics with the Prevention of Postoperative Fistula after Cleft Palate Repair. *Plastic and Reconstructive Surgery–Global Open*, *12*(2), e5589.

Davies, A., Deacon, S., Cobb, A., McLean, N., & David, D. (2022). Abstract Journal Craniomaxillofacial Surgery. *ANZ Journal of Surgery*, *92*.

De Agostino Biella Passos, V., de Carvalho Carrara, C. F., da Silva Dalben, G., Costa, B., & Gomide, M. R. (2014). Prevalence, cause, and location of palatal fistula in operated complete unilateral cleft lip and palate: retrospective study. *The Cleft Palate-Craniofacial Journal*, *51*(2), 158-164. doi: https://doi.org/10.1597/11-190

Dou, J., Huang, Y., Cheng, X., Li, J., & Shi, B. (2024). Analysis of Risk Factors for Velopharyngeal Insufficiency and Palatal Fistula After Sommerlad-Furlow Palatoplasty. *Journal of Craniofacial Surgery*, 10.1097.

Dudzic, W., Płatkowski, C., & Folwarski, M. (2023). Nutritional Status and the Outcomes of Endoscopic Stenting in Benign and Malignant Diseases of Esophagus. *15*(6). doi: 10.3390/nu15061524

Emara, D., Makeen, K., & AboulHassan, M. (2020). PRP Injection effect on palatal Fistula repair: A comparative study. *The Egyptian Journal of Plastic and Reconstructive Surgery*, *42*(2), 337-344.

Erdenetsogt, J., Ayanga, G. N., Tserendulam, D., & Bayasgalan, R. (2015). The closure of postpalatoplasty fistula with local turn-down flap. *Ann Maxillofac Surg*, *5*(2), 271-273. doi: 10.4103/2231-0746.175776

Farouk, A., & Abouarab, M. H. (2022). Optimizing Design and Mobility of Palatal Flaps in Repair of Wide Cleft Palate. *The Egyptian Journal of Plastic and Reconstructive Surgery*, *46*(3), 205-210.

Fayyaz, G. Q., Gill, N. A., Ishaq, I., Aslam, M., Chaudry, A., Ganatra, M. A., . . . Laub, D. R. (2019). Pakistan comprehensive fistula classification: a novel scheme and algorithm for management of palatal fistula/dehiscence. *Plastic and Reconstructive Surgery, 143*(1), 140e-151e.

Foroglou, P., Tsimponis, A., Goula, O.-C., & Demiri, E. (2015). Assessing an avoidable and dispensable reoperative entity: Self-referred flawed cleft lip and palate repair. *Hellenic Journal of Nuclear Medicine, 18*, 140-140.

Garg, R., Shah, S., Uppal, S., & Mittal, R. K. (2019). A statistical analysis of incidence, etiology, and management of palatal fistula. *National Journal of Maxillofacial Surgery, 10*(1), 43-46.

Gebremariyam, Z. T., Eshete, M., & Baraki, A. (2024). Clinical Outcomes after Cleft Palate Repair at a Major Referral Hospital in Addis Ababa, Ethiopia. *Plastic and Reconstructive Surgery–Global Open, 12*(10), e6225.

Gulati, S., Yadav, A. S., & Sharma, R. K. (2023). Congenital palatal fistula: Case report and review of literature. *Journal of Cleft Lip Palate and Craniofacial Anomalies, 10*(1), 37-39.

Ha, J. H., Jeong, Y., Koo, Y. T., Jeon, S., Chung, J., & Kim, S. (2020). Effect of collagen matrix on postoperative palatal fistula in cleft palate repair. *Scientific Reports, 10*(1), 15236.

Hosseinabad, H. H., Derakhshandeh, F., Mostaajeran, F., Abdali, H., Davari, H. A., Hassanzadeh, A., & Kummer, A. W. (2015). Incidence of velopharyngeal insufficiency and oronasal fistulae after cleft palate repair: A retrospective study of children referred to Isfahan Cleft Care Team between 2005 and 2009. *International Journal of Pediatric Otorhinolaryngology, 79*(10), 1722-1726. doi: https://doi.org/10.1016/j.ijporl.2015.07.035

Ishaq, I., & Fayyaz, G. Q. (2013). RECURRENT PALATAL FISTULA AND NASAL REGURGITATION;: Anteriorly based dorsal tongue flap: A reliable solution. *The Professional Medical Journal, 20*(03), 390-398.

Kantorowicz, G. (1990). Role of the restorative dentist in the management of cleft palate patients: discussion paper. *Journal of the Royal Society of Medicine, 83*(1), 29-29.

Kurian, D., Radder, K., & Desai, A. (2024). A retro-prospective study\' of cleft palatal fistulas: An analy\'sis of prevalence, cause and location in C) perated cleft lip and palate cases. *IP Journal of Otorhinolaryngology and Allied Science, 6*, 97-103. doi: 10.18231/j.ijoas.2023.023

Lam, D. J., Chiu, L. L., Sie, K. C., & Perkins, J. A. (2012). Impact of cleft width in clefts of secondary palate on the risk of velopharyngeal insufficiency. *Arch Facial Plast Surg, 14*(5), 360-364. doi: 10.1001/archfacial.2012.169

Landheer, J., Breugem, C., & Van Der Molen, A. M. (2010). Fistula incidence and predictors of fistula occurrence after cleft palate repair: two-stage closure versus one-stage closure. *The Cleft palate-craniofacial journal, 47*(6), 623-630.

Lebhar, M. S., Goza, S. D., Humphries, L. S., & Hoppe, I. C. (2022). Utilization of the labial flap in anterior palatal fistula repair. *Eplasty, 22*.

Long, R. E., Wilson-Genderson, M., Grayson, B. H., Flores, R., & Broder, H. L. (2016). Oral Health–related quality of life and self-rated speech in children with existing fistulas in midchildhood and adolescence. *The Cleft Palate-Craniofacial Journal, 53*(6), 664-669.

Mahajan, R. K., Kaur, A., Singh, S. M., & Kumar, P. (2018). A retrospective analysis of incidence and management of palatal fistula. *Indian Journal of Plastic Surgery, 51*(03), 298-305.

Mapar, D., Khanlar, F., Sadeghi, S., Abdali, H., Memarzadeh, M., Davari, H. A., & Derakhshandeh, F. (2019). The incidence of velopharyngeal insufficiency and oronasal fistula after primary palatal surgery with Sommerlad intravelar veloplasty: a retrospective study in Isfahan Cleft Care Team. *International Journal of Pediatric Otorhinolaryngology*, *120*, 6-10.

Nezafati, S., & Pourlak, T. (2023). Anterior Palatal Fistula Formation after Le Fort I Osteotomy in Conventional Orthognathic Surgery. *Case Reports in Dentistry*, *2023*(1), 9038781.

Oliva, S., Lorusso, F., Scarano, A., D'Amario, M., & Murmura, G. (2024). The Treatment and Management of Oroantral Communications and Fistulas: A Systematic Review and Network Metanalysis. *Dentistry Journal*, *12*(5), 147.

Park, M. S., Seo, H. J., & Bae, Y. C. (2022). Incidence of fistula after primary cleft palate repair: a 25-year assessment of one surgeon's experience. *Archives of plastic surgery*, *49*(01), 43-49.

Peyvasteh, M., Askarpour, S., Moradi, N., & Mansouri, A. (2023). Comparison of the Outcomes of Surgical Repair of Cleft Palate Performed by Modified Von Langenbeck and Bardach (Two-Flap Palatoplasty) Methods. *World J Plast Surg*, *12*(3), 94-99. doi: 10.61186/wjps.12.3.94

Phillips, J. B., Galarza, L. I., Sink, M. C., Goza, S. D., Brown, M. I., Hopper, S. J., . . . Humphries, L. S. (2024). Longitudinal Speech and Fistula Outcomes Following Primary Cleft Palate Repair at a Single Institution. *Annals of Plastic Surgery*, *92*(6S), S404-S407.

Prakash, A., Singh, S., Solanki, S., Doshi, B., Kolla, V., Vyas, T., & Jain, A. (2018). Tongue Flap as Salvage Procedure for Recurrent and Large Palatal Fistula after Cleft Palate Repair. *African Journal of Paediatric Surgery*, *15*(2), 88-92. doi: 10.4103/ajps.AJPS_131_16

Richardson, S., & Agni, N. A. (2014). Palatal fistulae: a comprehensive classification and difficulty index. *Journal of maxillofacial and oral surgery*, *13*, 305-309.

Selim, A. N., Khalifa, M. E., Ibrahim, M. T., & Serag, S. M. (2023). Evaluation of using collagen membrane as interpositional material in closure of palatal fistula in cleft patients. *Tanta Dental Journal*, *20*(4), 357-364.

Shankar, V. A., Snyder-Warwick, A., Skolnick, G. B., Woo, A. S., & Patel, K. B. (2018). Incidence of palatal fistula at time of secondary alveolar cleft reconstruction. *The Cleft Palate-Craniofacial Journal*, *55*(7), 999-1005.

Siriwiroj, S., Pisek, P., Punyavong, P., Jenwitheesuk, K., Surakunprapha, P., & Winaikosol, K. (2024). The Effect of Presurgical Nasoalveolar Molding on Oronasal Fistula Following Primary Palatoplasty. *Journal of Craniofacial Surgery*, *35*(2), 412-414.

Smyth, A. G., & Wu, J. (2019). Cleft Palate Outcomes and Prognostic Impact of Palatal Fistula on Subsequent Velopharyngeal Function-A Retrospective Cohort Study. *Cleft Palate Craniofac J*, *56*(8), 1008-1012. doi: 10.1177/1055665619829388

Syaharani, R. G., Oetomo, G. B., Fadiyah, M., Danudiningrat, C. P., & Sumarta, N. P. M. (2024). Comparison of palatal fistula incidence post palatoplasty with Veau-wardill kilner technique between men and women. *World Journal of Advanced Research and Reviews*, *23*(3), 3062-3069.

Tezuka, M., Kamikuri, Y., Ishihata, K., Kibe, T., Fuchigami, T., Amir, M. S., . . . Nakamura, N. (2022). Comparison of recurrence rate and speech outcome between two different techniques for cleft palatal fistula closure: A retrospective cohort study. *Journal of Cranio-Maxillofacial Surgery*, *50*(1), 86-92.

Vityadewi, N., & Bangun, K. (2013). Incidence of palatal fistula after one-stage palatoplasty and factors influencing the fistula occurrence. *Jurnal Plastik Rekonstruksi*, *2*(4).

Wang, Y., Yang, F., Liu, W., Fan, X., & Lu, Y. (2023). Evaluation of the effect of a resorbable membrane on the closure of palatal fistulas. *Frontiers in Surgery*, *10*, 1134934.

Wu, M., Zhu, Z.-B., Shi, B., Gong, C.-X., Zhang, B.-H., & Li, Y. (2020). Palatal fistula rate after Huaxi Sommerlad-Furlow palatoplasty. *Hua xi kou Qiang yi xue za zhi= Huaxi Kouqiang Yixue Zazhi= West China Journal of Stomatology*, *38*(2), 166-169.

Ysunza, P. A., Pamplona, M. C., & Repetto, G. (2015). Cleft palate, interdisciplinary diagnosis, and treatment.

Yuan, N., Dorafshar, A. H., Follmar, K. E., Pendleton, C., Ferguson, K., & Redett III, R. J. (2016). Effects of cleft width and veau type on incidence of palatal fistula and velopharyngeal insufficiency after cleft palate repair. *Annals of plastic surgery*, *76*(4), 406-410.

Zietsman, M. S., Dibbs, R. P., Davis, M. J., Volk, A. S., Buchanan, E. P., & Monson, L. A. (2021). Furlow versus straight line repair with intravelar veloplasty: a 7-year single institution experience with fistula formation. *FACE*, *2*(4), 364-370.

Zubovic, E., & Patel, K. (2021). Discussion: The Effect of Surgical Timing on 30-Day Outcomes in Cleft Palate Repair. *Plastic and reconstructive surgery*, *147*(1), 138-140.