A Case Report of Submucous Cleft Palate Resulting in Sudden Perforation and its Phonetic Philological Study

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Received February 21, 1989

Key words: Submucous cleft palate/Perforation/Phonetic philology

Diseases resulting in acquired perforation or defect of the palate are known to include postoperative maxillary defect in cases of tumor, and palatal perforation due to trauma and syphilis. These diseases cause a marked speech disorder depending on their severity.

We encountered a 46-year-old woman with submucous cleft palate that suddenly resulted in perforation in the midline of the soft palate. Palatoplasty and pharyngeal flap operation were performed with satisfactory results. We describe here this case and the results of examination of phonetic philology and investigations of nasopharyngeal closure function.

Case Report

The patient was a 46-year-old woman whose first examination was on March 5th, 1987, because of speech disorder. She first felt a pain in the soft palate around January 1987. Subsequently, hypernasality occurred and she noted a small, finger-tip-sized perforation in the midline of the soft palate. These symptoms were left untreated, and then she visited our department.

Before the symptoms appeared, she had no subjective and objective disorders in phonetic philology.

Present findings
Systemic findings: The patient was of medium stature and moderately nourished without any abnormal findings in other respects.
Local findings: The face was symmetrically normal, without any abnormal sings. Intraoral examination revealed a bifid uvula and a small, finger-tip-sized perforation accompanied with redness around the midline of the soft palate. The mucosa in this area was thin, and a bone defect (bony notch) could be palpated at the midline of the posterior end of the hard palate (Fig. 1).

Preoperative findings obtained by phonetic philological test and nasopharyngeal closure function test
Preoperative tests were carried out to examine the effect on phonetic philological function of perforation of the soft palate just before the time of closure of the perforation with porcine dermis (sterilized and lyophilized porcine dermis softened with physiological saline and applied with a surgical adhesive) (Fig. 2).

1. Results of intelligibility rating examinations

Intelligibility ratings for monosyllable sounds and nonsense three-syllable sounds were determined using the 67 pronunciation sounds, except for contracted sounds and double (long) consonants, which constitute the Japanese language.

Intelligibility rates for the monosyllable sounds and nonsense three-syllable sounds were 59.7% and 40.3%, respectively, when the soft palate was perforated. However, the respective rates were 95.5% and 70.1% on closure of the perforation with the porcine dermis.

2. Results of hydrodynamic examination

Hydrodynamic examination was performed for each of the sound "ka, ki, ku, ke, ko", "sa, shi, su, se, so" and "ta, chi, tsu, te, to". The data were expressed in wave forms in order from the upper column, for nasal air pressure (NP), oral air pressure (OP), nasal airflow (NA), oral airflow (OA) and voice. The test findings obtained when the soft palate was perforated showed a waveform indicating a marked increase in NA for all sounds tested. In contrast, both OP and OA showed excessive decreases.

After the perforation had been closed by application of the porcine dermis, NA increased and OA decreased as compared to those examined, during perforation. An OP wave also appeared and a spiked waveform due to preceding phonation was partly observed (Fig. 3, 4).

3. Findings of nasopharyngeal fibrescopic examination

Perforation of the soft palate and a V-shaped pit at the posterior end of the soft palate
were confirmed while the patient being at rest (Fig. 5). When "ka" was pronounced, the perforated site was laterally extended, and the uvula palatina was observed from the direction of the perforated site. A slightly open area was observed at the nasopharyngeal cavity (Fig. 6). When "ka" was pronounced after the application of the porcine dermis, the open area was observed in the nasopharyngeal cavity, which indicated an incomplete closure even though the perforated site was covered (Fig. 7).

Treatment and course: On April 9, 1987, palatoplasty and pharyngeal flap operation were performed for a closure of the perforation under general anesthesia. The
postoperative course was favorable, and at present, 1 year and 3 months after the operation, hypernasality has disappeared, and neither open of the perforated site nor other symptoms have occurred (Fig. 8). Postoperative findings obtained by phonetic philological test and nasopharyngeal closure function test:

1. Results of intelligibility rating examinations
   The postoperative intelligibility rates were 100% and 83.6% for the monosyllable sounds and nonsense three-syllable sounds, respectively.

2. Results of hydrodynamic examination
   The waveform of the increased NA mostly disappeared, and a waveform indicating a marked increase in OA was observed. An increasing pattern of the OP waveform and spike waves due to preceding phonation were also occasionally observed (Fig. 9).

3. Findings of nasopharyngeal fibrescopic examination
   At rest, the perforation of the soft palate was closed, and the pharyngeal flap was observed at the center of the perforated site (Fig. 10). When "ka" was pronounced, the flap showed compression toward the center, and the open area that had been observed preoperatively in the naso-

NP

OP

NA

OA

Voice

Ka Ki Ku Ke Ko Sa Shi Su Se So Ta Chi Tsu Te To

Fig. 8 Postoperative photograph showing closure of the perforation and pharyngeal flap.

Fig. 9 Results of hydrodynamic examination (Postoperation).

Fig. 10 Nasopharyngeal fibrescopic view (Postoperation, at rest).

Fig. 11 Nasopharyngeal fibrescopic view (Postoperation, at pronunciation of "ka").
pharyngeal cavity was not observed, which indicated a complete closure (Fig. 11).

Discussion

Submucous cleft palate is a condition mainly characterized by a V-shaped notch at the midline of the posterior end of the hard palate (bony notch), midline muscular diastasis and bifid uvula\(^1\). The incidence of the condition among the total number of cases of clefts of lip, alveolous and palate is relatively low; Gylling et al. (1976)\(^2\), Crikelair et al. (1970)\(^3\) and Fujita et al. (1980)\(^4\) reported figures of 5.8%, 4.3% and 4.22%, respectively. Furthermore, there seems to have been no case of submucous cleft palate like that in our patient, in which acquired perforation of the palate occurs in adulthood. In the present patient, perforation was assumed to have occurred at the thin palatal mucosa as a result of inflammatory symptoms, since the patient had been aware of pain in the soft palate and redness was observed in the tissue surrounding the perforated site.

With regard to the effect of palatal perforation on speech, there have been many reports of fistula in the hard palate remaining after surgery for cleft palate; Stark (1977)\(^5\) reported the occurrence of hypernasality when the diameter of the palatal fistula was 5mm or more, and Kanbara (1975)\(^6\) stated that a palatal fistula area of 15mm\(^2\) and a proportion of the fistula occupying 2% of the hard palate were borderline standards for the occurrence of disorder. There have been very few reports on the effect of perforation of soft palate alone on speech, and no definite opinion seems to have been established. Our present patient showed interesting findings; nasopharyngeal fiberscopic examination revealed lateral enlargement of the perforated site on pronunciation. It was also clarified that this enlargement caused marked disorder from both phonetic philological and hydrodynamic viewpoints.

As for the treatment of palatal perforation, closure with obturator\(^7\) or surgical closure with local oral mucosa\(^8\) or tongue flap\(^9\) has been performed for perforation of the hard palate. For perforation of the soft palate, on the other hand, it is difficult to perform closure with obturator because of its mobility, and it is therefore necessary to perform palatoplasty. In our present patient, the treatment involved combined use of palatoplasty and pharyngeal flap operation, taking the complication of nasopharyngeal closure failure into consideration along with the fact that the patient had perforation of the soft palate in the submucous cleft palate. The result was extremely favorable, suggesting that this surgical treatment is an effective procedure for perforation of the soft palate.

Summary

We examined a 46-year-old woman with submucous cleft palate, who experienced sudden perforation in the midline of the soft palate, by phonetic philology test and nasopharyngeal closure function test. Closure by combined use of palatoplasty and pharyngeal flap operation was performed, and very favorable results were obtained.
References

突発的に穿孔を来した粘膜下口蓋裂の1例とその音声言語学的検討

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粘膜下口蓋裂は、硬口蓋後端部のV字状切痕、軟口蓋正中部粘膜下の筋肉離開、口蓋垂裂の三つを主徴とする疾患である。その発現頻度は、脣顎口蓋裂全体の約4〜5%といわれている。

今回、われわれは、46歳女性で突発的に軟口蓋正中部に穿孔をきたし、鼻腔漏出を呈した粘膜下口蓋裂の1例を経験した。穿孔以前には発音障害を認めていなかったため、穿孔の発音に対する影響を検討する目的で、穿孔部に滅菌乾燥豚皮を貼付し比較検査を行ない、最終的に口蓋形成術および咽頭弁形成術の併用にて穿孔閉鎖術を施行した。

以上、初診時、豚皮貼付時、術後の3期において音声言語学ならびに鼻咽腔閉鎖機能について検査検討を行なったので本症例の概要に加えて報告した。

結果は以下のごとくで、語音発音明瞭度では、初診時単音節59.7%、無意味3音節40.3%、以下豚皮貼付時95.5%・70.1%、術後100%・83.6%と著しい改善の変化を認めた。さらに流体力学的および鼻咽腔内視鏡検査においても著明な改善が認められた。

以上の結果より、軟口蓋穿孔が著しい発音障害を引き起こすこと、さらに軟口蓋穿孔における口蓋形成術および咽頭弁形成術の併用処置が外科的処置の1法として、きわめて有効であることが確認された。