

Passavant's Ridge in Patients with Soft Palatectomy

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Very little is known about the developmental aspects of Passavant's ridge. Several studies have looked at the prevalence of Passavant's ridge in the cleft palate patient where palatopharyngeal insufficiency has been present from birth. No one has reported on the prevalence of Passavant's ridge in adults with acquired soft palatal defects that result in palatopharyngeal insufficiency. This information would add to our knowledge of the developmental aspects of formation of Passavant's ridge.

In this study, 29 soft-palatectomy patients were examined with an oral panendoscope for presence of Passavant's ridge.

Eighty-three percent of the patients had Passavant's ridge during speech; 17 percent did not. In the 83 percent that had the ridge, the intensity of movement varied and was equally distributed among minimal, moderate, and extreme movement.

KEY WORDS: *Passavant's ridge, palatopharyngeal insufficiency, soft palatectomy, oral panendoscope*

Perhaps no other area of the human anatomy is as poorly understood and controversial as Passavant's ridge. Even since Passavant (1863, 1869) published his papers erroneously stating that this ridge was part of the normal speech mechanism, there has been controversy. The controversy over shape, location, function, consistency, and mechanism of the ridge has been adequately outlined (MacWilliams et al, 1984).

One of the aspects of Passavant's ridge where some information is available is the prevalence of the ridge. Calnan (1957) noted Passavant's ridge in 30 of 85 patients (36 percent) with cleft palate. One has to presume he was referring to ridge formation during speech. He noted the ridge in only one of 20 normal subjects during speech. His observations were based on lateral radiographic studies. Fletcher (1957) found Passavant's ridge in three of 10 normal children in a cinefluoroscopic study. Hagerty et al (1958)

found the ridge in nine of 80 (11 percent) normal subjects in a radiographic study during speech. Nylen (1961) found Passavant's ridge in 11 of 27 (41 percent) patients with cleft palate prior to surgery. These patients were examined during speech in a cineradiography study. Mas-sengill (1969) found 18 of 190 (9 percent) patients with cleft palate to have Passavant's ridge during phonation in a cinefluoroscopic study. Skolnick et al (1973) reported a fluoroscopic study on 62 patients with cleft palate and velopharyngeal insufficiency. Seventeen of these (27 percent) patients had Passavant's ridge, and 4 of 23 (17 percent) normals had the ridge. Croft et al (1981) examined 80 normals and 500 cleft palate patients with velopharyngeal insufficiency. Passavant's ridge was found in 15 of the 80 normals (19 percent) and 120 of the 500 cleft patients (24 percent). Their study was a multiview videofluoroscopic and nasendoscopic investigation during speech. Henningsson and Isberg (1986) found Passavant's ridge in 3 of 8 (37 percent) patients with cleft palate during speech in a cineradiography study.

If one looks at the collective figures of the above papers, we see that 23 percent of patients with clefts and 15 percent of normal patients have Passavant's ridge reported during speech (Table 1). It has been the author's clinical experience

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that the actual proportion for the patients with cleft's is much higher than 23 percent. The same experience holds true for patients who have had their soft palate partially or totally removed because of carcinoma. The prevalence of Passavant's ridge in the soft palatectomy patient has never been reported. Since little is known about the developmental aspect of Passavant's ridge (McWilliams, 1985), it was felt that knowledge of the prevalence of Passavant's ridge in the adult patient with an acquired surgical defect of the soft palate would be useful. The purpose of this study was to document the prevalence of Passavant's ridge in a group of soft palatectomy patients.

METHOD

Twenty-nine consecutively seen partial and total soft palatectomy patients were included in this study. Ages of patients ranged from 39 to 75, with a mean of 61 years. This mean age was substantially higher than those reported by authors in Table 1 (viz; Hagerty—36 years; Massengill—13 years; Croft—19 years for normal subjects and Henningsson—17 years). Nineteen patients were male and 10 were female,

giving a 2:1 ratio, which is identical to American Cancer Society statistics on sexual differences in prevalence of oral cancer (Silverberg and Lubera, 1986). Twelve of the patients had total soft palatectomies, and 17 had partial soft palate resections. Of the partial resections, there were those that included the posterior border and were confined mainly to the right (8 patients) or left (4 patients) sides; the posterior one-third bilaterally (1 patient); the anterior one-third (3 patients); and the anterior two-thirds (1 patient). Patients with pharyngectomy were not included because of surgical interference with the superior constrictor muscle. All patients except two had a diagnosis of squamous cell carcinoma. The remaining two presented with benign mixed salivary gland tumor and adenoid cystic carcinoma. The length of time between the surgery and examination ranged from immediately postoperatively to 78 months post surgery, with a mean of 19.6 months. All examinations were performed by the author using direct and mirror examination while the patient phonated "ah," and also using an oral panendoscope (Taub, 1966) while the patient phonated "aah" and "pap-ap-pap."

TABLE 1 Composite of Literature Reporting Prevalence of Passavant's Ridge

Author	Cleft Pts. With Passavant's Ridge	Normal Pts. With Passavant's Ridge
Calnan (1957)	30 / 85 36%	1 / 20 5%
Fletcher (1957)	— —	3 / 10 30%
Hagerty <i>et al</i> (1958)	— —	9 / 80 11%
Nylen (1961)	11 / 27 41%	— —
Massengill <i>et al</i> (1969)	18 / 190 9%	— —
Skolnick <i>et al</i> (1973)	17 / 62 27%	41 / 23 17%
Croft <i>et al</i> (1981)	120 / 500 24%	15 / 80 19%
Henningsson+Isberg (1986)	3 / 8 37%	— —
Totals and Average	199 / 872 23%	32 / 213 15%

RESULTS

The results of this study showed that 24 of the 29 patients examined demonstrated Passavant's ridge (82.75 percent). Five of 29 (17.24 percent) did not demonstrate the ridge. Statistical analysis showed that the 95 percent confidence interval for the percentage of patients with Passavant's ridge is 64 to 93 percent. Figure 1 shows the above results, while at the same time showing the variations in intensity or ridge patterns that occurred. In the Type I pattern of Passavant's ridge, there was minimal elevation of the ridge along the posterior pharyngeal wall, with slightly more elevation on the lateral walls. Eight of 29 patients (27 percent) fell within this group. In the Type II Passavant's ridge, there was slight to medium posterior and good lateral wall ridge formation. Seven of the 29 (24 percent) patients were in this group. In the Type III Passavant's ridge pattern, there was excellent posterior and lateral wall movement. Nine of 29 patients (31 percent) were in the type III group. The patients with Passavant's ridge were equally dispersed among the three patterns of intensity of Passavant's ridge, with no statistical difference among groups. Mean ages of groups I, II, and III were 60, 62, and 63 years respectively, compared to 61 years for the overall mean age. Note that in all patients with Passavant's ridge, no matter what the intensity, the ridge was continuous between the posterior and lateral pharyngeal walls.

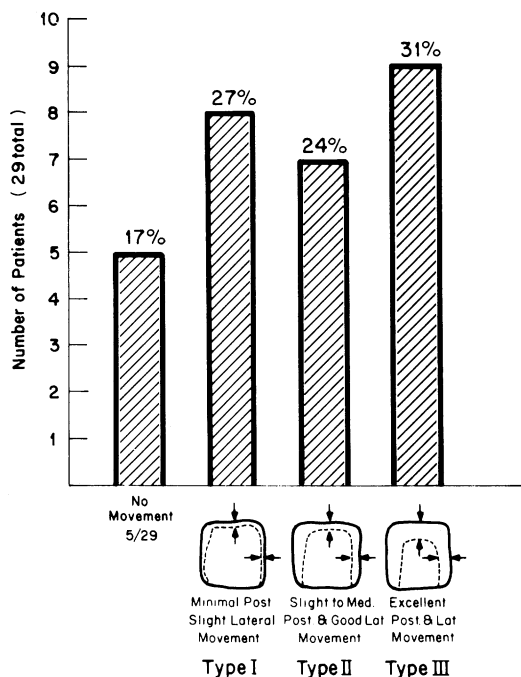


FIGURE 1 Histogram of distribution of variation in Passavant's ridge intensity in 29 soft palatectomy patients.

While the debate over shape, location, function, consistency and mechanism of Passavant's ridge goes on, the movement of the pharyngeal walls needs to be taken into account in fitting prostheses for soft palatectomy patients. Figure 2 shows the posterior and lateral nasopharyngeal walls in a patient with a partial soft-palatectomy. The pharynx is shown at rest and during phonation of "aah," showing a Type III ridge. The only possible rehabilitation for this patient is a prosthesis. A speech-aid must be shaped that is in light contact with Passavant's ridge during speech and swallowing to effect separation of oral and nasal cavities (Fig. 3). At rest, with the ridge relaxed, a "freeway space" is present between the pharyngeal walls and the speech-aid, which allows normal nasal breathing (Fig. 4). Patients usually complain about not having a normal nasal airway.

DISCUSSION

As was suspected prior to this study, it was confirmed that the incidence of Passavant's ridge in palatectomy patients was much higher (83 percent) than the 23 percent composite reported in the literature in cleft palate patients (Table 1). Although it was not possible to correlate statistically the intensity of Passavant's ridge with the length of time from surgery, some interesting points will be mentioned. The patients who had no ridge were not those seen earliest in the postoperative period. In fact, one of the five patients with no ridge was 72 months post-surgery. The others were 6, 6, 11, and 12 months postoperative. Those patients seen closest to surgery were at 4 days (1 patient), 1 week (1 patient), and 2 weeks (2 patients). These four had Passavant's ridges, of Types III, II, and I, and I respectively.

Perhaps the most interesting patient seen was one with squamous cell carcinoma of the uvula and posterior edge of the soft palate. The structures involved were actually destroyed and missing when this patient was first seen preoperatively. At that time he had a Type III Passavant's ridge, with as prominent a ridge as any seen in the other patients. He had noticed no change in his speech, nor had he any nasal leakage during deglutition.

The variations seen in the intensity of Passavant's ridge are to be expected and have been previously reported. Glaser et al (1979) stated "we have recently become aware of extremely minute Passavant's ridges in the neutral position only after their initial detection in the hyperextended position." As with all anatomic structures and physiologic mechanisms in the human body, there is always a full range of variations in form

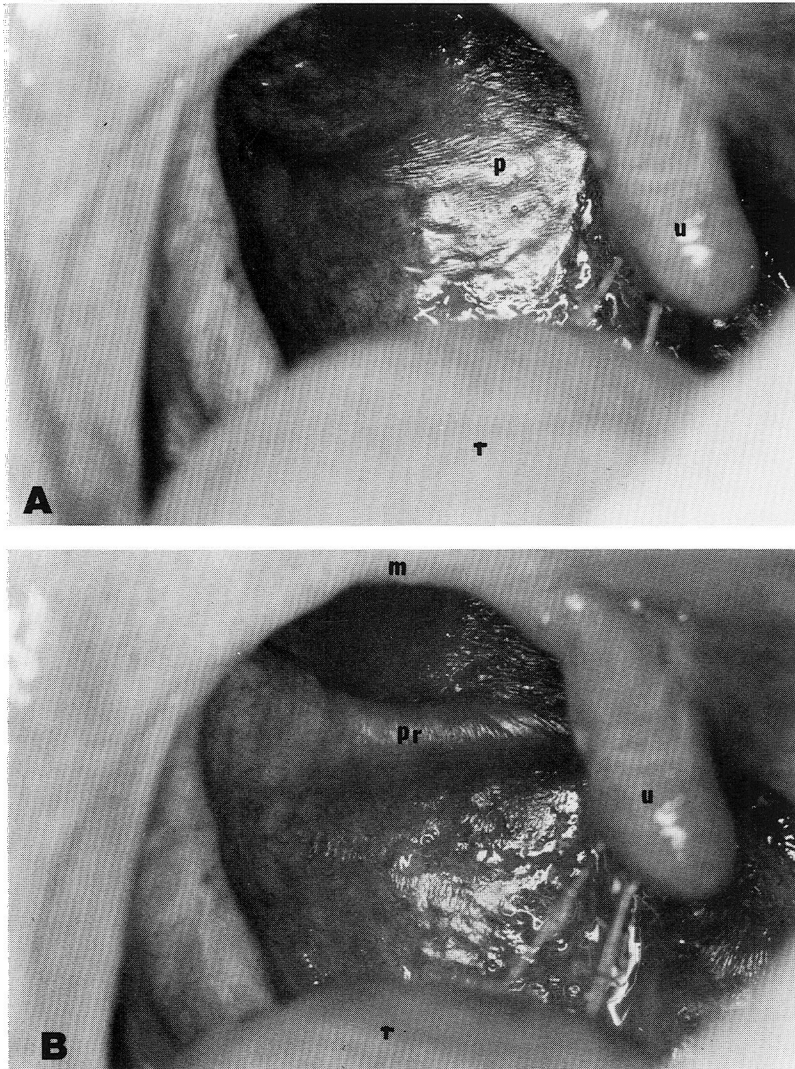


FIGURE 2 *A*, Posterior and right lateral pharyngeal walls at rest in a patient with a right partial soft palatectomy. (l = lateral pharyngeal wall; u = uvula; t = tongue; p = posterior pharyngeal wall). *B*, Type III Passavant's ridge in same patient during phonation of "aah." (m = anterior margin of resection of right partial soft palatectomy; pr = Passavant's ridge; u = uvula; t = tongue).

and function within the population. Although this paper has categorized the 24 patients with Passavant's ridge into three types, there is undoubtedly an infinite variation between no Passavant's ridge and extreme ridge formation. This is the reason why the palatopharyngeal mechanism is so difficult to understand completely.

The extreme variations between the results of this study and previous studies also has an explanation. In this study 83 percent of palatectomy patients had Passavant's ridge. These observations were made directly via oral panendoscopy, and we were able to detect minor forms

of Passavant's ridge that may not be possible to observe by radiographic techniques—especially those not using barium coating of the pharyngeal area (Glaser et al, 1979). Also, earlier investigators may have accepted the definition of Passavant's ridge as being a localized major movement of the posterior and lateral pharyngeal wall. In other words, the Type III ridge described in this paper may have been the only type they were able to observe radiographically and interpret as Passavant's ridge. Thus, the 23 percent of patients with clefts with ridges in Table 1 may be compared with the 31 percent of

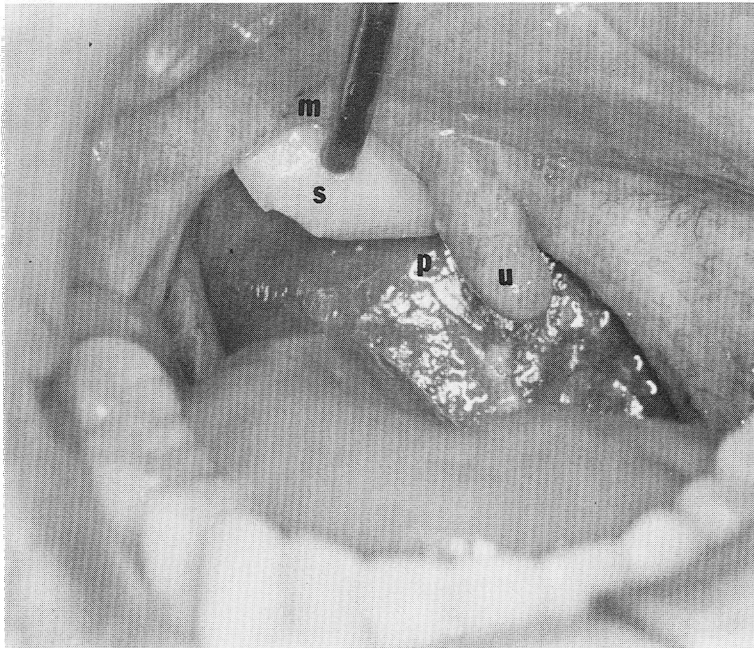


FIGURE 3 Same patient as Figure 2 with speech aid in place during phonation of "aah" with Passavant's ridge in contact with speech aid (s = speech aid; m = anterior margin of resection of right partial soft palatectomy; p = posterior pharyngeal wall; u = uvula).

Type III ridges in this study. The discrepancy may be explained by earlier papers not including minor forms of Passavant's ridge.

The fabrication of a speech-aid in the soft palatectomy patient without Passavant's ridge is certainly necessary, but ends in a compromise. The prosthesis must be in proximity to the pharyngeal walls to eliminate hypernasality and prevent nasal reflux during swallowing. In these patients, a space must exist between the speech-aid and the pharyngeal walls to allow nasal breathing and clearance for normal head movements. A compromise must be achieved, since no functional activity exists. The maxillofacial prosthodontist and the patient must decide what amount of hypernasality, swallowing reflux, and increased nasal respiratory resistance is acceptable. A perfect result is not possible in these non-Passavant's ridge patients owing to lack of functional activity of the posterior and lateral pharyngeal walls. These patients often end up unhappy with the result.

Thus, the presence of Passavant's ridge as a compensatory mechanism is of extreme importance to the maxillofacial prosthodontist treating soft palatectomy and cleft palate patients needing speech-aids. There is no question of the functional value of Passavant's ridge in these patients, as the positioning of the speech-aid is under the control of the maxillofacial prosthodontist. He can tailor the position of the speech-aid to the

position of the ridge. The fact that the ridge is present in 83 percent of soft palatectomy patients means that the majority of them can be successfully treated prosthetically.

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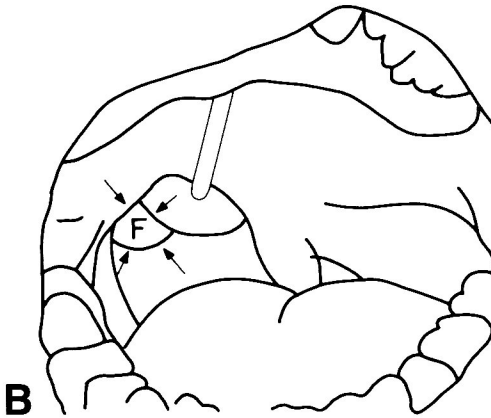
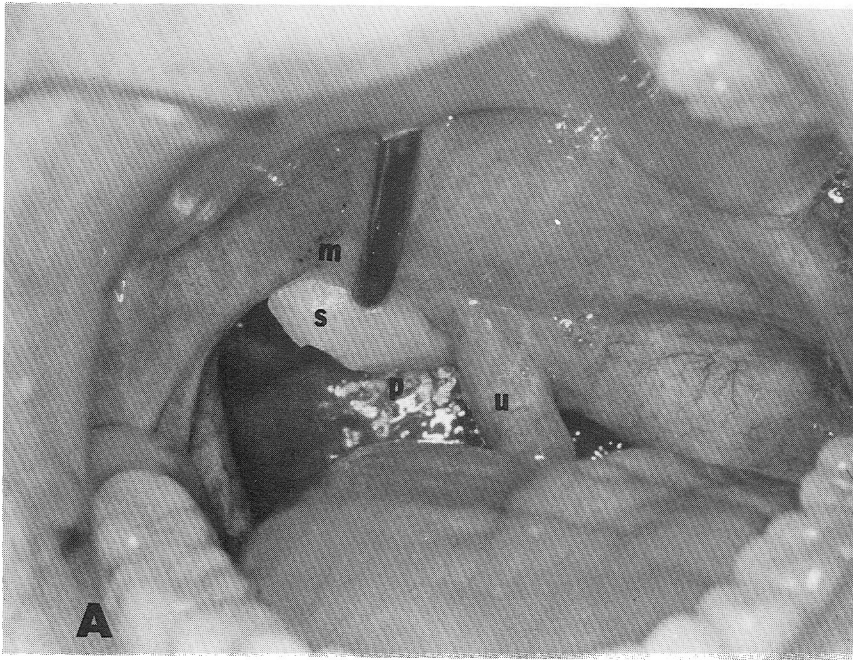


FIGURE 4 A, Same patient with pharyngeal walls relaxed, showing "freeway space" for nasal breathing. (s = speech aid; m = anterior margin of resection of right partial soft palatectomy; p = posterior pharyngeal wall; u = uvula). B, Line drawing of Figure 4A showing "freeway space" (F).

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