On the Piriform Recesses and their Acoustic Effects

P.	Mermelstein
----	-------------

From the Bell Telephone Laboratories, Incorporated, Murray Hill, N.J.

Author's address: P. Mermelstein, D. Sc, Bell Telephone Laboratories, Inc., Murray Hill, N. J. (USA)

In a recent paper by Flach and Schwickardí [1] it is reported that “the elimination of the acoustic effect of the piriform recesses by the insertion of swabs produces changes in the sound spectrum, especially at the frequencies of the higher formants”. In most cases the spectral levels at frequencies above 1500 Hz were severely attenuated, attenuation increasing with frequency. It is implied that insertion of swabs closes off the piriform recesses acoustically, and it is concluded that such closing off accounts for the attenuation of the higher frequencies. An unstated implication is that the piriform recesses normally accentuate the higher frequencies.

It should be pointed out that insertion of cotton swabs into a cavity of the vocal tract does not eliminate the acoustic effects of the cavity, but introduces acoustic effects of its own, namely, the attenuation characteristics of the inserted material. In order to eliminate the acoustic effects, according to the authors' intent, one would have to shut off the piriform recesses from the central tract by means of a material resembling the tract wall in its acoustic properties. Cotton is not such a material – its absorption characteristics are higher than the tract wall tissues, and they increase with frequency. The findings of Flach and Schwickardí are consistent with this explanation.

Any nonuniformity in the cross-sectional area of the vocal tract has acoustic effects. The ratio of the dimension of the nonuniformity to the wavelength of the sound wave can serve as a simple guide to the importance of such effects. For example, at a formant frequency of 2500 Hz, the wavelength is approximately 14 cm, much larger than any recess dimension. Let us assume a pair of semi-spherical recesses having a total cross-sectional area of 10 cm², corresponding Mermelstein, On the Piriform Recesses and their Acoustic Effects 389

to a radius of 1.8 cm. A side branch 1.8 cm long, closed at one end, has its lowest resonance at a wavelength four times the length, 7.2 cm, i. e., a frequency of 4900 Hz. Near this frequency we may expect an anti-resonance or minimum in the speech spectrum. At lower frequencies the major effects that the piriform recesses can be expected to have are slight shifts in the formant frequencies as compared to those measured in their absence due to the local increase in the cross-sectional area. Thus closing off the piriform recesses is not expected to have any major acoustic effects below 4000 Hz.

References

1. Flach, M. und Schwickardí, H.: Die Recessus Piriformes unter phoniatischer Sicht. Folia phoniât. 18: 153–167 (1966).

SOCIETATES

ler Congrès de la Confederation européenne des Laryngectomisés

Dans le cadre du Palais du Conseil de l'Europe à Strasbourg eut lieu le premier Congrès de la Confederation européenne des Laryngectomisés. Trois cent opérés du larynx y assistèrent, la

majorité s'exprimant avec la voix oesophagienne et quelques-uns, très peu, avec différents types de prothèse laryngienne. La présidence était re-présentée par le Dr G. Greiner, professeur de la Clinique d'O. R. L. de la Faculté de Médecine de Strasbourg.

Le Dr H. Grainger du Conseil de l'Europe ouvrit la session exposant une partie des finalités de cette organisation, qui sont l'aide aux pays sous-développés dans la santé publique et les recommandations pour prêter l'attention à la rehabilitation des invalides sourds et logopathiques. M. V. Arletti, président de la Confédération, après avoir remercié les médecins pour leur assistance au Congrès, expose la genèse et le développement des Associations des Laryngectomisés en Europe, qui commença à Milan en 1965 et dont les buts sont: l'union de toutes les Associations, encourager l'étude médicale et la rehabilitation phoniatrique, la protection sociale et attirer l'attention des autorités civiles sur leurs problèmes.