Effects Of Tonsillectomy On Acoustic Parameters
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Abstract
The vocal tractus from the glottis to the lips is considered to be a resonator and any change in its shape may cause voice changes. Since tonsillectomy causes a shape and volume difference in supraglottic area, it is assumed that acoustic characteristics may change postoperatively. In this study, the effects of tonsillectomy over voice parameters is examined.

INTRODUCTION
Tonsillectomy is a common surgical procedure performed to treat upper respiratory tract infections and/or obstructive disease. This procedure is one of the most performed surgical procedures worldwide.

MATERIAL & METHOD
20 patients (13 males, 7 females), aged between 21 and 39, mean age 29, were included to the study. They all went tonsillectomy for recurrent episodes of tonsillitis under regional anesthesia. Voice samples to measure F0 (fundamental frequency) and F1, F2, F3 formants were recorded 1 week before and 3 months after the surgery. These parameters were analyzed on a sustained [a:] using the CSL main program with the Computerized Speech Lab CSL 4300B (Kay Elemetrics Ltd., Lincoln Park, NJ, USA). The patients were also asked, whether they perceived any change in their voices postoperatively. None of the patients perceived any change in his/her voice postoperatively.

RESULTS
Results were shown in table 1. The means and the standard deviations of the study groups were shown in table 2. Fundamental frequency (F0) did not show any statistically significant change postoperatively. F1 formant has a tendency to decrease, F2 and F3 formants has a tendency to increase after surgery. But this is statistically not significant. None of the patients perceived any change in his/her voice postoperatively.
DISCUSSION

The effects of tonsillectomy on the voice have not been studied extensively from the perspective of acoustic changes, other than its effect on nasalance (\(N\)). A few studies have examined potential changes in vocal quality after tonsillectomy. In general, minimal changes were found (1-5). Tonsillectomy can affect the voice by enlarging the resonating chamber and altering the formant frequencies or by altering the conformation of the tonsillar fossae (1,3). Potentially, part of the soft palate musculature can be removed or disturbed. This could theoretically lead to scarring and subsequent limitation of fine motor control or even velopharyngeal closure (6).

It is not expected that fundamental frequency (F0) change after tonsillectomy. Because it is an operation that did not directly affect larynx and not influence the rate at which vocal folds open and close during phonation.

With respect to supralaryngeal factors, if extirpation of soft tissue from the oropharynx altered the anatomy of the
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supralaryngeal acoustic transmission pathway and possibly
the dynamics of physiologic function, the acoustic measures
related to vocal tract resonances could be changed (1). If
viewed from the vowel structures’s point, some vowels may
show a change in their structure after tonsillectomy, but
since the structures of vowel /a/ remained basically
unchanged postoperatively, it may partly explain the
statistically indifferent changes in formants in our study (1).

Chuma et al. reported that tonsillectomy had only minor
quantitative and qualitative effects on various acoustic
parameters (1). Saida et al. and Hori et al. also reported
similar observations in their studies (2,3). In general, it was
reported that after tonsillectomy, fundamental frequency and
F1 and F2 formant frequencies remained unchanged whereas
F3 decreases and F4 increases postoperatively (1). But some
other reports doesn’t support this findings (1,7).

Patients may ask about the possibility of voice changes after
tonsillectomy. Patients’ perception of voice is an important
treatment outcome measure, especially in the case of benign
disease where the greatest impact is on the quality of life (1).
They should be advised of potential voice changes,
especially professional voice users who may be particularly
sensitive to changes in resonant characteristics. However,
according to Behrman et al., one fifth of the patients
perceived their voices to be improved after surgery and none
thought that the voice to be worse (1). Therefore, it is
concluded that patients are unlikely to perceive a change in
voice as a result of surgery, but in those cases where a
difference is perceived, it is likely to be a positive change.

For children, anecdotal accounts of some parents suggest
that tonsillectomy changes sometimes voice production
within the first few weeks after surgery. These parental
concerns may in part reflect short-term acoustic changes
associated with hyponasal speech improving to normal,
normal speech becoming more hypernasal (1). In our study,
the subjects were not asked to come just after surgery, since
it was expected that during the healing process some voice
parameters be changed and limitation in singing or
performing be noted (1). The focus of our study was to
research any permanent voice change after surgery.

In a retrospective study among the performing artists done
by Jarboe et al. it was stated that patients’ voices were not
impaired after tonsillectomy. The majority of the patients
also reported that they perceived an improvement in their
singing, but this should not be discussed as an indication for
surgery, simply a possible coincidental outcome. The
expression of improvement in voices after surgery could be
related to the reduction of discomfort in throat and to the
enlarged resonating chamber.

The gathered information in his study suggests that
tonsillectomy can be performed safely in vocal performing
artists despite their specialized requirements for pharyngeal
function (1).

CONCLUSION

Based on our study, tonsillectomy does not have any effect
over fundamental frequency. Although changes in formant
frequencies after surgery is not significant, in cases for vocal
performing artists, they should be warned for the possible
subtle changes in voice colors after surgery, though it is
presumably positive.

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