

Review of Lit on SARME

[Koudstaal MJ](#), [Poort LJ](#), [van der Wal KG](#), [Wolvius EB](#), [Prah-Andersen B](#), [Schulten AJ](#). **Surgically assisted rapid maxillary expansion (SARME): a review of the literature.** [Int J Oral Maxillofac Surg](#). 2005 Oct;34(7):709-14.

Transverse maxillary hypoplasia, in adolescents and adults, is frequently seen in non-syndromal and syndromal patients including cleft patients. In skeletally matured patients, the uni- or bilateral transverse hypoplasia can be corrected by means of a surgically assisted rapid maxillary expansion. The treatment is a combination of orthodontics and surgical procedures and provides dental arch space for alignment of teeth. The procedure also causes a substantial enlargement of the maxillary apical base and of the palatal vault, providing space for the tongue for correct swallowing and thus preventing relapse. In addition, a distinct subjective improvement in nasal breathing associated with enlargement of the nasal valve towards normal values is seen with an increase of nasal volume in all compartments. In this article we give a review on surgically assisted rapid maxillary expansion. We conclude that there is no consensus in the searched literature regarding either the surgical technique, the type of distractor used (tooth-borne or bone-borne), the existence, cause and amount of relapse and whether or not overcorrection is necessary. A proposal for a prospective randomized patient study in order to find answers to the lacunas in knowledge regarding this treatment is done.

TIMING

[Bicakci AA](#), [Agar U](#), [Sokucu O](#), [Babacan H](#), [Doruk C](#). **Nasal airway changes due to rapid maxillary expansion timing.** [Angle Orthod](#). 2005 Jan;75(1):1-6.

The purpose of this study was to evaluate the effect of rapid maxillary expansion (RME) on nasal minimum cross-sectional area (MCA) using acoustic rhinometry (AR) in **two groups of subjects who were treated before and after the pubertal growth spurt**. The sample consisted of 29 patients with maxillary constriction and a control sample of 15 subjects. Both samples were divided into two groups according to individual skeletal maturation as assessed by the cervical vertebral maturation (CVM) method. Group I T (early-treated) consisted of 16 patients (eight girls and eight boys). Group I C (early-control) consisted of eight patients, and both groups had not reached the pubertal peak (CVM Stage 1-3). Group II T (late-treated) consisted of 13 patients (eight girls and five boys). Group II C (late-control) consisted of seven patients, and both groups were at a stage during or after the pubertal peak (CVM Stage 4-6). AR records were obtained for each treated subject before treatment (T1), after expansion (T2), and immediately after a three-month retention period (T3); only T1 and T3 records were obtained for controls. The overall increase in MCA was significantly greater in the early- and late-treated

groups (group I T, group II T) as compared with the early and late controls. (group I C, group II C) ($P < .05$). The results of the present study suggest that even the overall (T1-T3) increase for MCA in group I T is greater (0.34 mm) than the increase for MCA in group II T (0.19 mm), but the difference was not significant ($P > .05$).

de Moura CP, Vales F, Andrade D, Cunha LM, Barros H, Pueschel SM, Clemente MP. Rapid maxillary expansion and nasal patency in children with Down syndrome. Rhinology. 2005 Jun;43(2):138-42.

Down syndrome (DS) is the most common aneuploid disorder at birth. The life expectancy of persons with DS has improved over the last forty years and is now at about sixty years. Phenotypic characteristics include general hypotonia, maxillary hypoplasia with a small oral cavity and a somewhat larger appearing tongue, frequent constricted maxillary arch, nasal obstruction and others. This prospective study assesses the effects of rapid maxillary expansion (RME) on nasal patency of children with DS, using acoustic rhinometry (AR). Twenty four children with DS, aged 5 to 12 years, had been randomly allocated to the RME and control groups. AR was performed to these individuals prior to expansion, approximately one month after, post maximal expansion, and after a 5 months period of retention. The data between the two groups were compared. Rapid maxillary expansion produced a significant augmentation of nasal volume in children who had been treated ($p < 0.05$) compared to the control group; these results were stable through the period of retention.

Buccheri A, Dilella G, Stella R. Rapid palatal expansion and pharyngeal space. Cephalometric evaluation. Prog Orthod. 2004;5(2):160-71.

OBJECTIVES: the aim of this study was to evaluate cephalometrically the upper respiratory airway dimensions before and after rapid maxillary expansion. MATERIALS AND METHODS: rapid palatal expansion was performed on 24 5-9 year old children with adenotonsillar hypertrophy determined radiographically by means of lateral cephalographs. Also, the subjects were questioned concerning their ability to breath through their noses. RESULTS: there was an increase in upper respiratory width that often coincided with a reported improvement in nasal respiration. Adenoid volume was not reduced. CONCLUSIONS: the increase in pharyngeal space and improvement in nasal breathing resulted from an increase in pharyngeal lumen enlargement rather than a reduction in the volume of the adenoid tissue.

Basciftci FA, Mutlu N, Karaman AI, Malkoc S, Kucukkolbasi H. Does the timing and method of rapid maxillary expansion have an effect on the changes in nasal dimensions? Angle Orthod. 2002 Apr;72(2):118-23.

The aim of this study was to assess the effects of rapid maxillary expansion (RME) and surgical assisted rapid maxillary expansion (SARME) on nasopharyngeal area. The study group consisted of 30 subjects in the permanent dentition who had both maxillary constriction and a posterior cross-bite. The patients were divided into two groups, RME and SARME. The subjects in the RME group consisted of 15 patients (eight girls, seven boys) whose average age was 12.1 +/- 1.1 years. The SARME group also consisted of 15 patients (eight boys, seven girls) whose mean age was 18.4 +/- 1.4 years. An acrylic bonded RME appliance was used in both groups. Surgery was performed using lateral cortical osteotomies in the SARME group. The nasopharyngeal and respiratory area was determined using a digital planimeter on lateral cephalometric radiographs taken before and after RME. Nasal cavity width was evaluated on postero-anterior radiographs. Nasal dimension was measured using planimeter measurements of the respiratory and nasopharyngeal areas before and after treatment. The data obtained were analyzed using SPSS. Comparisons within the groups were carried out with paired t-tests and comparisons between the groups were with a Student's t-test. In both groups, the respiratory area and the ratio of the respiratory area to nasopharyngeal (RA/NA) area increased following RME. There were no statistically significant differences between the groups. Nasal cavity width and maxillary width also increased, but the difference between the groups was not significant. Following RME, various differences in both the maxilla and surrounding bones occurred and nasal width increased with a decrease in nasal airway resistance. At the end of treatment there were increases in the width of the nasal floor near the midpalatal suture and nasal cavity. As the maxillary structures separated, the outer walls of the nasal cavity moved laterally resulting in an increase in internal nasal volume. **Nasal resistance decreased and respiratory area increased in patients treated with RME.**

Wriedt S, Kunkel M, Zentner A, Wahlmann UW. Surgically assisted rapid palatal expansion. An acoustic rhinometric, morphometric and sonographic investigation. J Orofac Orthop. 2001 Mar;62(2):107-15.

This study aimed to evaluate the effect of surgically assisted rapid palatal expansion on the skeletal structures of the midface. Ten patients (mean age 28.5 years) were investigated by means of acoustic rhinometry, study model analysis and sonography before and after the procedure of surgically assisted rapid palatal expansion. The measurements revealed that surgically assisted rapid palatal expansion not only resulted in transverse expansion of the maxilla, providing dental arch space for lining up the teeth; the procedure also caused a substantial enlargement of the maxillary apical base and of the palatal vault, providing space for the tongue for correct swallowing and thus preventing relapse. There was a distinct subjective improvement in nasal breathing associated with enlargement of the nasal valve towards normal values and with an

increase of nasal volume in all compartments. The measurements showed a marked influence of surgically assisted rapid palatal expansion on the skeletal structures of the midface. The significant widening can be demonstrated by non-invasive examination. Success of the osteotomy procedure can be readily monitored by sonographic examination of the expansion and the subsequent ossification, which allows individually adjusted retention periods and avoids frequent radiation exposure.

Kunkel M, Ekert O, Wagner W. [Changes in the nasal airway by transverse distraction of the maxilla] Mund Kiefer Gesichtschir. 1999 Jan;3(1):12-6. [Article in German]

OBJECTIVE: To investigate nasal airway changes through transverse maxillary distraction osteogenesis by means of an objective, reliable, noninvasive investigation technique with special attention to nasal valve changes and widening of the posterior maxilla. **PATIENTS AND INTERVENTION:** Eight patients with a severe maxillary transversal deficit underwent surgically assisted rapid palatal expansion in local or general anesthesia. Before and after the distraction process, a transnasal series of acoustic measurements of nasal airway profile was performed under topical decongestion. Nasal volume was calculated by integration of the area profile. The cross-sectional area of the nasal valve was also determined. **RESULTS:** A significant enlargement of nasal volume was recorded in all patients ($P < 0.01$: Wilcoxon signed rank test). The average increase measured 5 cm³ (23%). The increase in volume was recorded in all parts of the nasal cavity, indicating complete maxillary expansion even in the posterior segment. The nasal valve area raised from 0.56 to 0.70 cm² ($P < 0.01$). Six out of eight patients reported striking improvement of nasal patency after maxillary distraction. **CONCLUSION:** Besides correction of the maxillary arch deformity, rapid palatal expansion contributes to improved nasal patency by resolving nasal valve constriction. Significant widening of the posterior nasal cavity was achieved, indicating a translational pattern of maxillary movement, although the pterygomaxillary junction was not touched in the osteotomy.

Rong MR. [Three dimensional analysis of CT image on naso-maxillary complex in cleft lip and palate patients] Kokubyo Gakkai Zasshi. 1994 Dec;61(4):492-511. [Article in Japanese]

This study was designed to clarify the three dimensional features of naso-maxillary complex in cleft lip and palate (CLP) by using computed tomography (CT) and to examine its change following an upper dental arch expansion. Sequential CT images with 2mm-thickness were obtained for 11 unilateral CLP boys (UCLP), 6 bilateral CLP boys (BCLP) and 4 boys without cleft (non-cleft). Additionally, two serial sets of upper dental cast before and after dental arch expansion coupled with CT images in UCLP were used to evaluate the effect of dental arch expansion on the naso-maxillary complex. UCLP demonstrated a remarkable naso-maxillary deformity characterized by a decreased

volume of maxillary sinus in comparison with the non-cleft patients. Both the volume and shape of nasal cavity were significantly different between the cleft and non cleft side. Naso-maxillary morphology of BCLP, however, was similar to that of the non cleft except for the decreased volume of alveolar arch. Comparative study of UCLP and BCLP showed a significant difference in naso-maxillary morphology. There were some significant correlations between the dental arch expansion and change of each naso-maxillary component, suggesting the effect of expansion stress on the naso-maxillary complex in UCLP. However, deformation caused by expansion stress varied, depending on each component of the naso-maxillary complex.