THE EVOLUTION OF THE ADENOIDECTOMY: ANALYSIS OF DIFFERENT POWER-ASSISTED TECHNIQUES

PAGELLA F[1], PUSATERI A[1], CANZI P[1], CAPUTO M[1], MARSEGLIA A[2], PELIZZO G[3], MATTI E[1].

[1] *Department of Otorhinolaryngology - Foundation IRCCS Policlinico San Matteo, Pavia, Italy*
[2] *Department of Pediatrics, University of Pavia - Foundation IRCCS Policlinico San Matteo, Pavia, Italy*
[3] *Department of Pediatric Surgery, University of Pavia - Foundation IRCCS Policlinico San Matteo, Pavia, Italy*

Techniques and instruments for adenoidectomy have considerably changed over the years. With the introduction in Otolaryngology of power-assisted instruments for endoscopic sinus surgery, the classic adenoidectomy performed with curette or adenotome has evolved, with an improved patients' outcome and a better satisfaction of the surgeon. The purpose of this article is to describe and critically analyze the literature reports about different methods of power-assisted adenoidectomy. We performed a literature search (Medline) to identify all available reports. We discussed the surgical techniques and reviewed advantages and disadvantages of each method. The techniques can be schematically divided in non-endoscopic, usually performed with a laryngeal mirror, and endoscopic-assisted. The endoscopic control can be obtained either trans-nasally or trans-orally, as well as the microdebrider can be inserted in the nasal cavity or maneuvered through the oral cavity. Some authors reported the usage of the power-assisted instruments in performing the entire adenoidectomy; while, according with other authors, the microdebrider can be used as a step of the surgical procedure, for a combined adenoidectomy. In conclusion, all the methods seem to be safe and effective, and the personal experience of the surgeon should guide the choice of the instruments. However, we personally consider the endoscopic techniques as the most suitable, and among these the Transoral Endonasal-Controlled Combined Adenoidectomy (TECCA) should be considered as the most ergonomic technique to perform a power-assisted adenoidectomy.

Adenoidectomy, with or without tonsillectomy, is one of the most common surgical procedures performed by Otolaryngologists in the pediatric patients. Nowadays, in a patient with a documented adenoid hypertrophy, the most common indications for adenoid surgery are nasal obstruction, sleep apnoea, otitis media with effusion, and recurrent otitis media.

Techniques and instruments have considerably changed over the years. The classic surgical technique performed with an adenoid curette or an adenotome has recently evolved by the introduction of the endoscopic sinus surgery instrumentation, with an improved patients' outcome and a better satisfaction of the surgeon [1–6]. The standard adenoidectomy technique is performed with an adenoid curette or an adenotome, under general anesthesia via oro-tracheal intubation [7,8]. The majority of surgeons perform the procedure blindly, without a direct visualization of the rhinopharynx. A partial visualization of the adenoid pad can be obtained by retracting the soft palate with rubber catheters or by using a laryngeal or a dental mirror. This direct control is particularly useful in avoiding damage to important structures located nearby the adenoid tissue, such as the Eustachian tube and/or the pharyngeal muscles. Postoperative complications such as velopharyngeal insufficiency, tubaric stenosis and nasopharyngeal stenosis are rare but difficult to resolve when occur. In up to one-third of children with clinically significant adenoid hypertrophy, conventional curettage adenoidectomy does not achieve an adequate removal of obstructive adenoid tissue, especially when there is an intranasal extension, or a bulky mass of adenoids superiorly in the rhinopharynx and in the peritubaric region [3,4,6,9-11].

To possibly reduce the morbidity linked to the adenoid

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Corresponding Author:
Fabio Pagella, MD. Department of Otorhinolaryngology, University of Pavia and Foundation I.R.C.C.S. Policlinico S. Matteo, V. le Golgi 19, 27100 Pavia, Italy.
E-mail: tpagella@libero.it Phone: +39 0382 526218

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tissue persistence and to prevent recurrences, total excision of the adenoids is an important goal of this surgery. Initially, the adenoid clearance was confirmed by a digital palpation of the rhinopharynx and this procedure is still performed by some Otolaryngologists [9]. Subsequently, the use of an angled mirror or an endoscope during the adenoidectomy provided adequate visualization of the field, and these techniques are currently preferred [12–15].

In the last years, several surgical techniques have been proposed to ensure a finer and more assured removal of the adenoid mass, as well as to obtain a better control of intraoperative bleeding. Suction diathermy was initially introduced for hemorrhage control following conventional curettage [16]. Subsequently, the whole procedure was performed with this technique, always along a laryngeal/dental mirror or endoscopic control [17–20]. The introduction of powered instrumentation for sinus surgery prompted the use of a shaver system for a power-assisted adenoidectomy; however, the approach still was a trans-oral one, along with an indirect visualization through a laryngeal mirror [1–5,21]. In the '90s, the advent of ESS popularized the use of intranasal scopes and the endoscopic adenoidectomy became the natural evolution of the conventional adenoidectomy, permitting a direct visualization [13,22]. By using this technique the adenoid remnants along the superior portion of the rhinopharynx, the choanae and the peritubal region, can be clearly visualized and, thus, removed. In the following years, a power-assisted adenoidectomy conducted completely through a trans-nasal approach and under an endoscopic guidance was suggested by Parson in 1996 [23] and firstly reported by Yanagisawa in 1997 [24].

MATERIALS, METHODS AND RESULTS

This review describes and critically analyzes the literature reports about different methods of power-assisted adenoidectomy, focusing in particular on advantages and disadvantages of each technique. Computer-based literature search (Medline) was used to identify available English language report about adenoidectomy. Only power-assisted techniques were included in this analysis.

Several reports were found about the usage of power-assisted instruments in adenoid surgery. This analysis considered 12 articles. Among these, the techniques can be schematically divided in non-endoscopic, usually performed with a laryngeal or a dental mirror [1–5,21], and endoscopic-assisted [6,11,25-27]. The endoscopic control can be obtained either trans-nasally or trans-orally, as well as the microderbider can be inserted in the nasal cavity (straight blades) or maneuvered through the oral cavity (curved blades). Some authors report the usage of the power-assisted instruments in performing the entire adenoidectomy; while, on the other side, according with other authors, the microdebrider can be used as a step of the surgical procedure (combined techniques). For a summarized view Table 1 shows the articles (Table 1).

The first reported technique was the method described by Koltai et al., Stanislaw et al., Rodriguez et al., Murray et al. and Heras et al. [1–5,21]. The adenoidectomy was performed with a debrider under an indirect visualization, through a transoral laryngeal-mirror control. The shaver cannula was usually curved (45° or 60°) and transorally introduced into the nasopharynx, and the oscillating blade was then switched on. The adenoidectomy started high in the nasopharynx, near the choanal sill, and then in a side-to-side manner, progressing on an even level until the inferior edge of the adenoid pad was reached. The tip of the oscillating cannula was always under visual control via the laryngeal mirror.

As an evolution, endoscopic-assisted methods, either transnasal [24,25] and transoral [26] were proposed. In these reports, the entire adenoidectomy was performed using the debrider.

In the transoral method proposed by Costantini et al. [26], two rubber catheters were introduced through the nasal fossae to apply a light upward traction to the soft palate, thereby increasing the longitudinal diameter of the passage. A 70° rigid endoscope was introduced through the mouth to visualize the nasopharynx, and consequently a 40° curved blade microdebrider was introduced through the mouth. Removal of the adenoid tissue started from the choanal extension, and proceeded backwards towards the posterior wall of the nasopharynx. The tip of the microdebrider can be introduced into the recess between the side adenoid tissue and the tubaric ostium so that the tissue can be completely removed without damaging the mucosa of the torus tubarius.

In the transnasal method, as reported by Yanagisawa et al. [24] and Al-Mazrou et al. [25], the theater setup and positioning was as for a standard functional endoscopic sinus surgery. The posterior choanae and nasopharynx were assessed using a 0°, 2.7 mm rigid telescope (or a 4 mm scope in older children). Under endoscopic vision, the shaver cannula was passed into the nose with the suction switched off to allow passage without traumatizing the turbinates or the septum. The suction was then turned on and the adenoidectomy was performed under constant endoscopic vision from proximal to distal with care not to lacerate the torus tubarius. The tissue was removed at the site of the oscillating blade only, and the blade was kept under vision all the time using the scope. The cutting and aspirating action of the shaver removed both adenoid tissue and blood, providing a clear view.

Finally, the combined power-assisted techniques was firstly described by Havas and Lowinger in 2002 [6] and then re-proposed by Pagella et al. in 2009 [11]. In these techniques, as a first step, a traditional trans-oral adenoidectomy with adenotome and/or curette was performed; then, in the eventual presence of residual adenoid tissue still causing a significant obstruction of the nasopharynx, the adenoidectomy was completed using a powered shaver. Under a trans-nasal endoscopic view (with a 0° rigid scope, 2.7 mm) the straight shaver cannula was passed through the nose and residual adenoid tissue was removed under endoscopic vision. The cutting and aspirating action of the shaver removed both adenoid tissue and blood, providing a clear surgical field and keeping the oscillating cannula always

under visual control.

As an evolution, Pagella et al. in 2010 described the Transoral Endonasal-Controlled Combined Adenoidectomy (TECCA) [27]. In this technique, after a traditional curettage of the adenoid pad, a 0°, 2.7-mm, rigid fiber optic endoscope was introduced through the nostrils to inspect the nasopharynx and to ensure a complete removal of the adenoid tissue. In the presence of residual adenoid tissue still obstructing the nasopharynx, the patient was undergone a completion of the adenoidectomy with the curved transoral microdebrider. The shaver used was the XPS (Xomed Powered System by Medtronic, Jacksonville, FL) with a 60° curved, 4 mm Tricut blade and straight-through suction irrigation at 500 rpm in the oscillating mode. Under endoscopic trans-nasal view the curved microdebrider, with the suction switched off to avoid oropharyngeal damages during the introduction, was advanced through the oral cavity and reached the nasopharynx. The suction was then switched on and the residual adenoid tissue was removed under trans-nasal endoscopic vision, with care not to damage the torus tubarius or the pharyngeal muscles.

DISCUSSION

Power-assisted instruments, such as microdebriders, were firstly introduced in Otolaryngology in the endoscopic sinus surgery for inflammatory sinus diseases, including nasal polyposis. Over the years, expanded use of these instruments included removal of benign and malignant nasal tumors, choanal atresia repair, laryngeal papilloma removal, and adenoidectomy [23].

In the experience of some authors [1–5,21] a complete microdebrider adenoidectomy with laryngeal mirror control was shown to be faster, and as safe as, than a traditional curettage adenoidectomy. However, in our opinion, nowadays a clear vision of the operating field is essential and this can be obtained, with excellent illumination and focus, with an endoscope. Compared to the image obtained by a laryngeal or dental mirror, the quality of the endoscopic image is unquestionably better. The endoscopic control can be either trans-oral (with a 70° angled scope) or trans-nasal (with a 0° scope). Under the endoscopic control a finer and more assured peritubal and perichoanal tissue clearance is possible, and a better control on the depth of the tissue resection is achieved. Careful tissue removal is carried out with the concomitant visual-protection of important nearby structures like Eustachian tubes, torus tubarius and the posterior pharyngeal wall.

As stated in some reports [1-5,21], the total operative time was significantly less when applying the debrider and blood loss, recovery time, and complications were comparable between those two techniques. Initially it may appear that the power-assisted adenoidectomy is a more hemorrhagic operation than the traditional curettage adenoidectomy; this may happen because the microdebrider removes small pieces of tissue with each oscillation, leaving a raw surface that bleeds during the rest of the procedure [2]. However, when continuous suction is used, the blood is evacuated along with the excised tissue, leaving a clear and unobstructed view of the operating field. In our experience, and this point was confirmed by all the literature reports, there was no increased primary or secondary bleeding related to the use of the microdebrider.

Table 1. *Summarized view of the power-assisted adenoidectomy, as reported in the selected literature reports. The techniques are sorted by year of publication.*

Authors	Year	Patients	Total debrider or combined	Visual control	Debrider
Yanagisawa [23]	1997	/	Total debrider	Transnasal (Endoscopic)	Transnasal
Koltai [1]	1997	40	Total debrider	Transoral (Mirror)	Transoral
Heras [21]	1998	329	Total debrider	Transoral (Mirror)	Transoral
Stanislaw [3]	2000	90	Total debrider	Transoral (Mirror)	Transoral
Koltai [2]	2002	677	Total debrider	Transoral (Mirror)	Transoral
Murray [4]	2002	100	Total debrider	Transoral (Mirror)	Transoral
Rodriguez [5]	2002	> 1000	Total debrider	Transoral (Mirror)	Transoral
Havas [6]	2002	51	Combined	Transnasal (Endoscopic)	Transnasal
Costantini [26]	2008	201	Total debrider	Transoral (Endoscopic)	Transoral
Pagella [11]	2009	70	Combined	Transnasal (Endoscopic)	Transnasal
Al- Mazrou [25]	2009	26	Total debrider	Transnasal (Endoscopic)	Transnasal
Pagella [27]	2010	51	Combined	Transnasal (Endoscopic)	Transoral

The technique proposed by Costantini et al. [26] consists in a trans-oral adenoidectomy using curved microdebrider and angled 70° scopes, although this seems to be an interesting proposal, in our opinion this techniques has two main disadvantages: the two – dimensional image offered by the transoral endoscope does not achieve an adequate perception of the surgical act; and it could be difficult to ablate the intrachoanal portion of the adenoid.

The use of the trans-nasal microdebrider and trans-nasal endoscopic view, as stated in some reports [6,11,24,25] ensures a complete adenoidectomy and, in particular, a better control over the extent of the resection, especially around the choanal sill and the torus tubarius. Sometimes this technique results as a difficult act especially in young children with narrow nasal passages. In such cases the introduction of both instruments in the nose may be difficult, and the surgical manoeuvrability limited also by the contact between the hand-piece and the scope attachment extra-nasally.

With the implementation in our experience of the Transoral Endonasal-Controlled Combined Adenoidectomy (TECCA) technique [27], some problems encountered during the latter procedure seem to be addressed. The efficacy and safety of both procedures are similar. The TECCA technique permits a better manoeuvrability of the instruments in case of narrow nasal spaces for a complete clearance of the nasopharyngeal area. This method can be effective to remove the lateral (peritubaric) and superior adenoidal tissue with a precision that is difficult to achieve with any other instrument, thereby minimizing the risk of damaging the surrounding structures. One possible limitation of this technique might be the higher price of the curved blades, as usually happens with the new equipment.

In the presence of bulky adenoids, a pure microdebrider adenoidectomy is a time-consuming and a cost-consuming procedure: we would rather not perform the entire procedure with the debrider so as not to significantly extend the total operative time; this is why we propose to perform the first step with standard adenoidectomy instruments (curette and adenotome), and complete the surgical procedure, if needed, with the powered instruments [6,11,27]. By performing the combined adenoidectomy approach, there is an obvious increase in operative time when both curette and power-assisted techniques are used rather than the sole curette. However, in experienced hands, this increase is limited to some minutes.

CONCLUSION

Different reports were found about the usage of power-assisted instruments in adenoid surgery. The visual control can be either endoscopic or non-endoscopic, as well as the shaver can be used trans-orally or trans-nasally. All the recent experiences emphasize the advantages of the endoscopic techniques in performing the adenoidectomy. These methods seem to be safe and effective, and the personal experience of the surgeon should guide the choice of the instruments and of the approaches. However, in our personal opinion, we consider the endoscopic techniques as the most suitable, and among these TECCA should be considered as the most ergonomic method to perform a power-assisted adenoidectomy. Such procedure permits a better maneuverability of the instruments in cases of narrow nasal spaces and carries no additional risk compared to other techniques.

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