

# IMPACT OF PEDIATRIC ADENOIDECTOMY TECHNIQUE

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## ABSTRACT

**Objectives:** Evaluate the impact of electrocautery, microdebrider and coblator techniques on outpatient pediatric adenoidectomy costs and outcomes.

**Methods:** An observational cohort study in a multi-hospital network using a standardized accounting system. Children 18 years of age and younger that underwent outpatient adenoidectomy were included from January 2008 to September 2015. Those undergoing additional procedures and those using more than one technique were excluded. The cohorts were divided into children that underwent electrocautery, microdebrider or coblator adenoidectomy. Direct cost of each procedure, surgical time, operating room (OR) time, complications, and adenoid regrowth were evaluated by instrument type.

**Results:** A total of 1,065 cases of adenoidectomy were performed with electrocautery (34.9%), microdebrider (26.1%), and coblation (39.0%) techniques. There was an increased average direct cost associated with the microdebrider \$834 (SD \$363) and the coblator \$796.6 (SD \$262) compared to the electrocautery \$597 (SD \$361) ( $p < 0.0001$ ). There was a greater overall OR time associated with use of the microdebrider (mean 28.7, SD 11.0 min), compared with both the electrocautery (mean 24.7, SD 8.1 min) and coblator (mean 26.2, SD 9.8 min) ( $p < 0.0001$ ). No significant difference was found in regards to complication rates, however, the incidence of repeat adenoidectomies was significantly greater for microdebrider (9.7%) compared to electrocautery (2.7%;  $p=0.0002$ ) and coblator (5.3%;  $p=0.0336$ ) techniques.

**Conclusion:** These results suggest that electrocautery adenoidectomy is significantly less expensive than microdebrider and coblator adenoidectomy. There were no differences in complication rates among the techniques. Microdebrider adenoidectomy was associated with a longer overall OR time and a higher rate of adenoid regrowth.

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## INTRODUCTION

Indications for adenoidectomy include obstructive sleep apnea, nasal obstruction, recurrent otitis media, otitis media with effusion, adenoid hypertrophy, and sinusitis.<sup>1</sup> Several techniques have been described for this procedure, however a trend from cold techniques to electrocautery, coblation, and microdebrider has been observed in the last decades.<sup>2</sup> The optimal method would facilitate the surgeon's ability to visualize the adenoid pad, provide efficient removal of the adenoids with minimal blood loss, be relatively inexpensive without an increase in complications.

There is a paucity of data comparing surgical techniques given the high frequency with which adenoidectomy is performed. Previous studies have focused on comparison of curettage to electrocautery, suggesting the latter is superior in terms of blood loss, operative time and precision.<sup>3</sup> However, no comparisons of electrocautery to powered techniques such as microdebrider and coblator adenoidectomy exist to date.<sup>4</sup>

	Electrocautery	Microdebrider	Coblation
Total procedures	372 (35%)	278 (26%)	415 (39%)
Average total cost (SD)	\$1,151.04 (\$671.09)	\$1,470.31 (\$654.02)	\$1,317.41 (\$413.01)
Average direct cost (SD)	\$597.25 (\$361.07)	\$833.25 (\$362.76)	\$796.60 (\$262.44)
Average surgical time (min) (SD)	9.35 (5.83)	10.78 (8.98)	9.47 (5.17)
Average time in OR (min) (SD)	26.24 (9.80)	28.69 (11.04)	28.35 (9.01)
Repeat adenoidectomy % (N)	2.69% (10)	9.71% (27)	5.30% (22)

Table 1. Summary of costs, operative times and revision rates with each technique.

## METHODS AND MATERIALS

- An observational cohort study was performed in a multi-hospital network using a standardized accounting system.
- Patients were identified with CPT codes for primary adenoidectomy in children <18 years between January 2008 and September 2015. Those undergoing additional procedures or secondary adenoidectomies were excluded.
- Surgery time was defined as the duration of the procedure alone whereas the total time in the operating room (OR time) included surgical time and set up. A non-parametric Kruskal-Wallis test was used to determine statistical significance of differences in direct cost, total cost, OR time and surgery time among the different instruments.
- The database was queried for ED visit or re-admission codes within 21 days after the procedure. The incidence of post-operative complications and repeat adenoidectomies were compared between surgical methods by use of contingency tables and a two-tailed Fisher's exact test for significance.

## RESULTS

### Cost and Time

- 1,065 total cases of adenoidectomy performed at 23 different medical facilities, by 64 different surgeons.
- There was a greater average direct cost associated with the microdebrider and the coblator compared to the electrocautery method ( $p < 0.0001$ ). There was no difference in direct cost between microdebrider and coblator ( $p > 0.9999$ ).
- There was no statistically significant difference in surgical times but there was a higher overall OR time associated with use of the microdebrider (mean 28.7, SD 11.0 min), compared with both the electrocautery (mean 24.7, SD 8.1 min) and coblator (mean 26.2, SD 9.8 min) ( $p < 0.0001$ ).

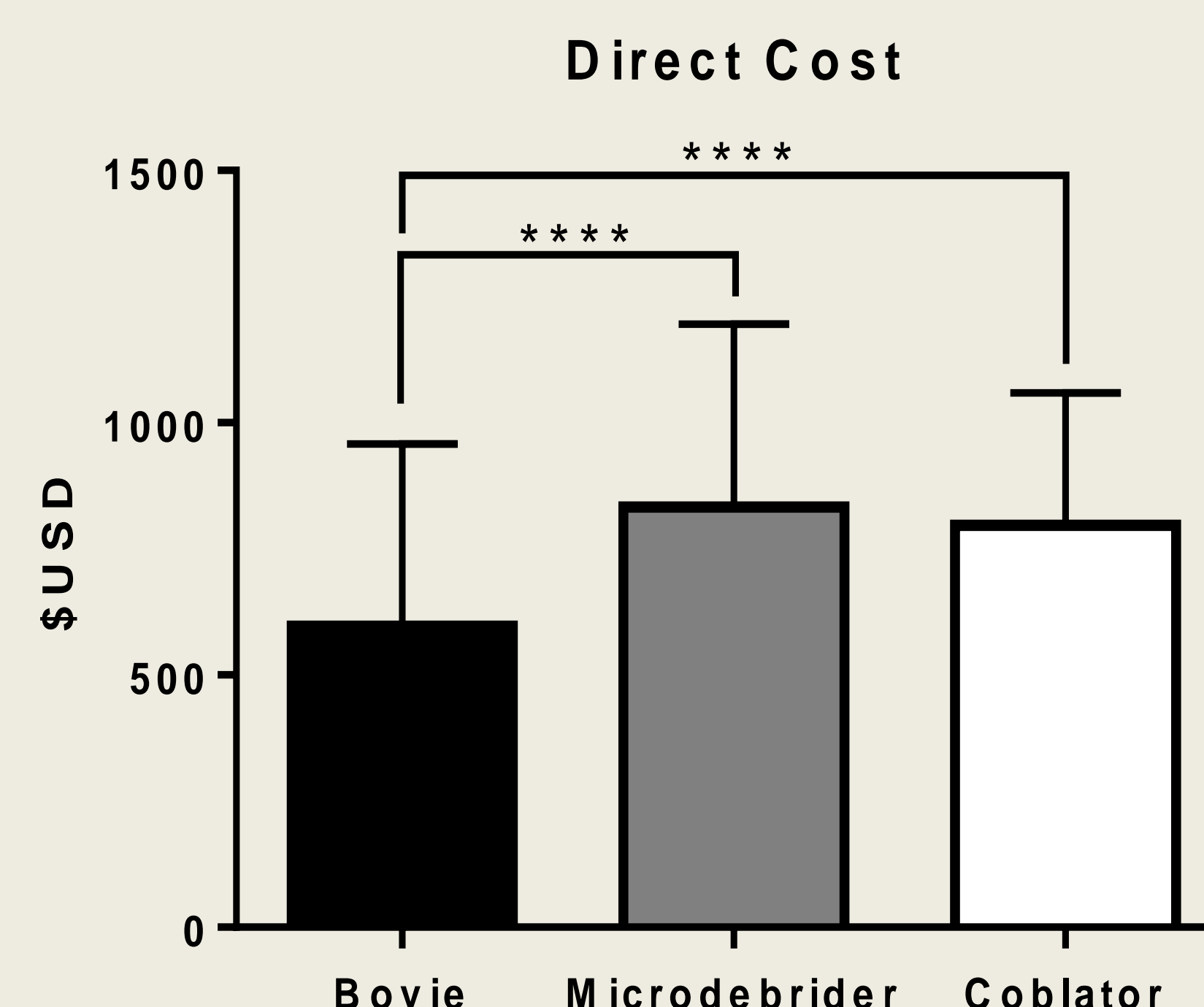


Figure 1. Direct costs between adenoidectomy methods. \*\*\*\*  $p < 0.0001$

### Outcomes

- Potential reasons for re-admission or presentation to the Emergency Room (ER) within 21 days included bleeding, emesis, fever, pain, asthma exacerbation, hypoxia, pneumonia, and apneic episode.
- The most common causes of presentation to the ER for post-operative dehydration fever ( $n = 12$ ), ( $n = 7$ ), and pain ( $n = 6$ ). Comparing these etiologies for ER visits demonstrated no significant difference in incidence between surgical methods.
- The incidence of repeat adenoidectomies was greater for the microdebrider (9.7%) compared to electrocautery (2.7%;  $p=0.0002$ ) and coblator (5.3%;  $p=0.0336$ ). The mean percentage incidence of repeat procedures per surgeon was not significantly different and was 1.5% (SD 4.7%), 3.3% (SD 5.6%), and 3.6% (SD 5.4%) for electrocautery, coblator, and microdebrider, respectively.

### Surgery Time

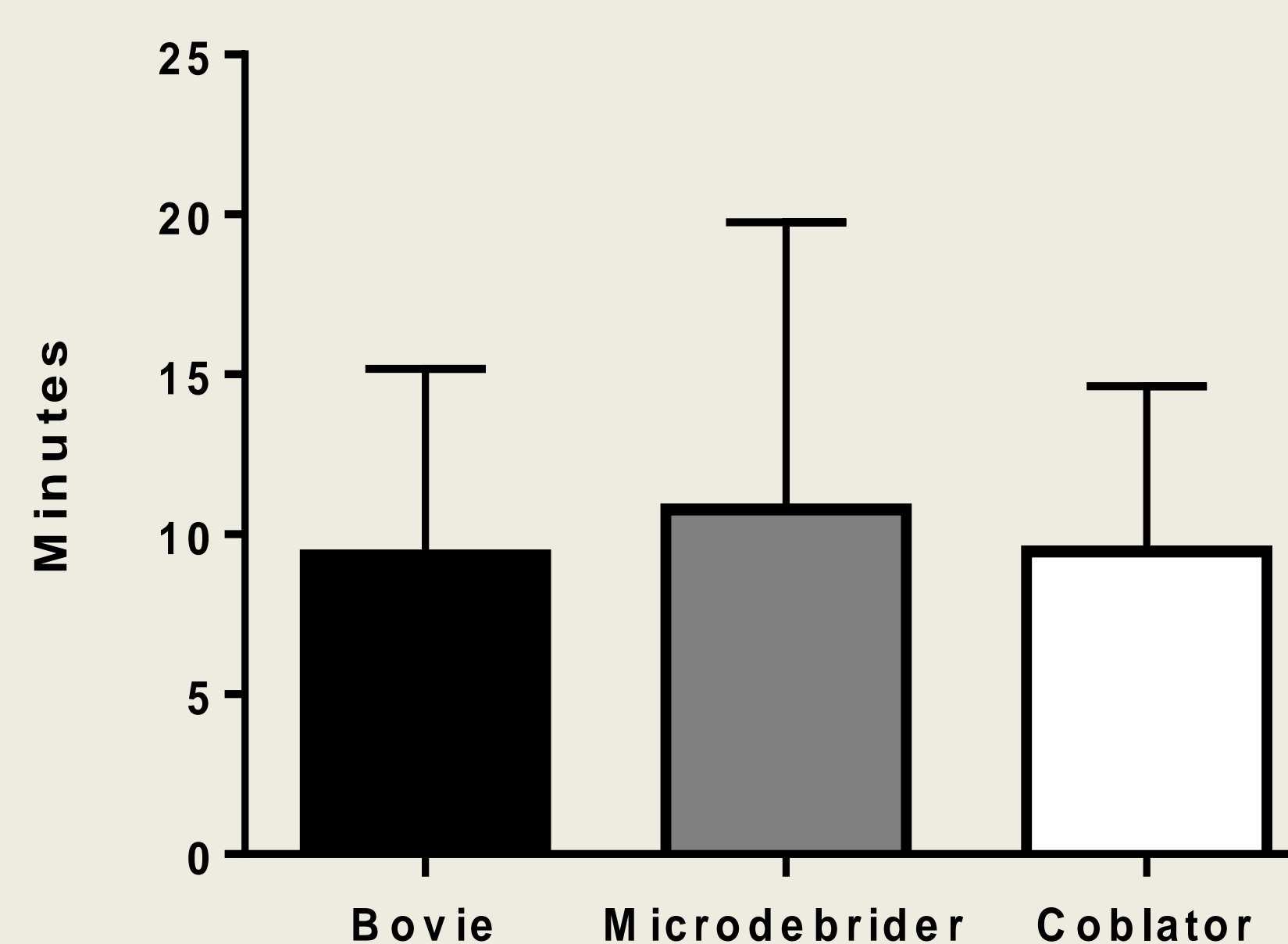


Figure 2. Surgery time comparing adenoidectomy methods.

## DISCUSSION

Adenoidectomy is the third most common ambulatory procedure in the United States.<sup>5</sup> Multiple methods exist for performing adenoidectomy, yet there is no consensus regarding the optimal technique. Otolaryngologists ranked effectiveness as the most important factor when choosing an instrument.<sup>6</sup>

Our results indicate that surgery was completed in a similar amount of time with all three methods. However, there was an increased overall OR time with the microdebrider which may be due to setup time. The time difference is modest per case, yet have greater implications for time savings with multiple adenoidectomies performed in one day. Direct costs of electrocautery adenoidectomy were on average significantly less expensive than microdebrider and coblation without any difference in immediate postoperative complications.

One long term complication of adenoidectomy is insufficient removal of adenoid tissue that a patient requires revision surgery. The microdebrider was associated with a greater revision rate compared to electrocautery or coblation. This may be due to inadequate tissue removal or more resident participation. Surgeons may be selecting larger adenoids for the microdebrider or coblation.

A blinded prospective study with controlled instrument settings would be helpful to support these results. A clearer understanding of these factors has the potential to reduce healthcare costs while delivering the same quality of care for this commonly performed procedure.

### Operating Room Time

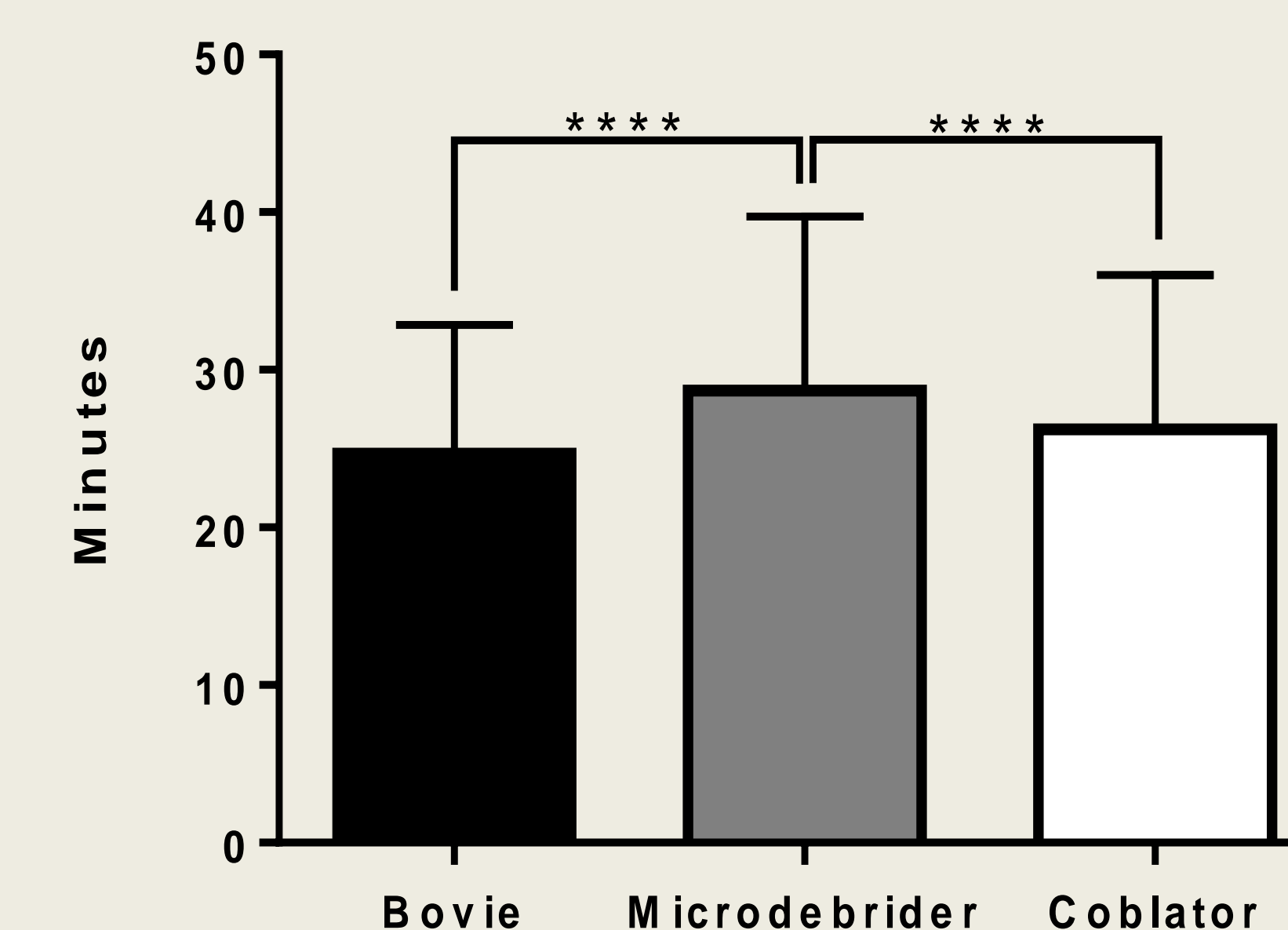


Figure 3. Total OR time by procedure. \*\*\*\*  $p < 0.0001$

## CONCLUSIONS

These results suggest that electrocautery adenoidectomy is significantly less expensive than microdebrider and coblator adenoidectomy. There were no differences in complication rates among the techniques. Microdebrider adenoidectomy was associated with a longer overall OR time and increased adenoid regrowth.

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