Local Anesthetic Method: PE Tube Insertion & TM Perforation

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Abstract

Objectives: Our hypothesis was that the rates of persistent tympanic membrane (TM) perforation following pressure equalization (PE) tube removal were not higher with topical phenol application. 1) Determine perforation rates using topical phenol. 2) Compare perforation rates using infiltration of lidocaine with epinephrine vs. topical phenol application.
Methods: This was a retrospective review of all patients undergoing insertion of Silverstein tube and microwick placement for dexamethasone infusion. The procedure was completed in an outpatient setting using either infiltration of lidocaine with epinephrine (control) or topical phenol (experimental). Dexamethasone (10mg/ml) drops were administered 3 times a day for 6 weeks, at which time the tube and wick were removed. All subjects were followed for 6 months for evidence of perforation or surgical repair. Fisher's exact test was used for statistical analysis.
Results: A total of 98 patients were identified. Thirty-two underwent lidocaine infiltration and 66 had topical phenol application. At 3 months, the perforation rate for the lidocaine group vs. the phenol group was 33% and 33%, respectively (p=0.81). Nine total perforations were surgically repaired (3 from the lidocaine group and 6 from the phenol group, p=1.00). At one year, the results favored the phenol group with less TM perforations (p-value 0.16).
Conclusions: Topical phenol appears to be a safe method of local anesthesia for PE tube insertion without significant increased risk of persistent perforation. Phenol also offers a cost-effective, less painful, and less time-consuming option in an outpatient setting.

Introduction

Myringotomy with insertion of pressure equalization (PE) tube is one of the most common procedures performed by otolaryngologists today. Most of these are completed under general anesthesia, such as in the pediatric population. However, when performed on adults this is typically performed under local anesthesia.
The use of local anesthesia has dated back many years. In 1884, Zaufel began using 10% cocaine in alcohol. This technique was abandoned due to severe vertigo.5 The use of Bonain's liquid was reported in 1898, which consisted of cocaine, phenol, and menthol preparation. Again, this produced severe vertigo.6 More recently, tetracaine and lidocaine have been infiltrated in the external auditory canal to produce localized anesthesia of the TM. Unfortunately, tetracaine is slow acting, often taking longer than 20 minutes for adequate anesthesia, and is reported to cause labyrinthine and facial paresis. Moreover, Lidocaine can be very painful during infiltration and also cause labyrinthine paresis. Phenol is another agent that has been used to produce local anesthesia of the TM. The advantages of Phenol have been isolated effect on the TM, but with reports of external otitis and possible healing difficulties of the TM.
For years, PE tube insertion has been the subject of study with respect to tympanic membrane (TM) perforation rates as a complication. Previously asked questions included studying various tube type, tube position, and duration of intubation. Our research did not indicate that the type of local anesthetic used had been the subject of previous research.1-4 We hypothesized that rates of persistent TM perforation following PE tube removal are not higher with topical phenol local anesthetic.

Figure 1a. Left TM with phenol applied to inferior posterior quadrant.

Figure 1b. Phenol applicator kit

Methods and Materials

This was a retrospective review of all patients undergoing a myringotomy for placement of a Silverstein tube and microwick. The myringotomy was placed at the same location for all patients, which was 115º from the umbo in the posterior-superior quadrant. All patients included in this study underwent administration of dexamethasone 10 mg/ml drops daily for 6 weeks for various indications. These myringotomies were performed under local anesthesia with either infiltration of lidocaine with epinephrine (control) or topical phenol (experimental). After 6 a week duration of intubation, the microwick was removed with or without the Silverstein tube. All patients were followed at three months, six months and one year for evidence of perforation or operative repair. Fisher's exact test was used to analyze the data for a significance of p≤ 0.05.

Results

A total of 98 Patients were identified as undergoing placement of Silverstein tube and microwick placement. Of these, 32 used lidocaine infiltration for local anesthetic and 66 had topical phenol applied for local anesthesia. The mean age of the lidocaine group was 56.1 years and the mean age of the phenol group was 61.8 years.
The results for three month follow-up after completion of therapy indicated that in the lidocaine group 31.3% had persistent perforations, 62.5% had a healed TM, and 6.2% still had a tube in place. The results for the phenol group indicated that 14.0% had a perforation, 48.5% had a healed TM, while 30.3% had a PE tube in place. After excluding the retained PE tubes and comparing the perforation rates of lidocaine to phenol, the results were similar with a rate of 66.7% and 68.7%, respectively (p-value of 0.81).
The results of one year follow-up demonstrated in the lidocaine group a perforation rate of 20.0%, healed TM rate of 76.7%, and retained PE tube rate of 3.3%. The results of phenol demonstrated a perforation rate of 6.8%, healed TM rate of 78.0, and retained PE tube of 15.2%. There was also not significant for a difference between lidocaine and phenol after excluding retained PE tubes with a rate of 20.7 % versus 8.0% respectively (p-value of 0.16). These results favored the phenol group for a healed TM.
The final analysis compared surgical intervention between the two groups. The rate of surgical intervention was 9.4% in the lidocaine group and 9.1% in the phenol group p-value 1.0). This indicated that there was no difference between the two groups when surgical intervention is required.

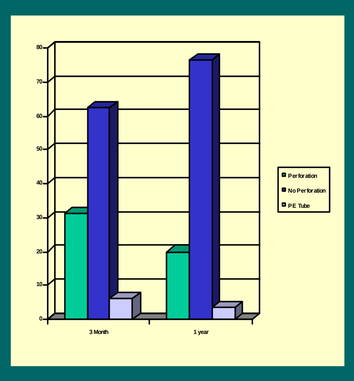

Figure 1.a Outcome for Lidocaine.

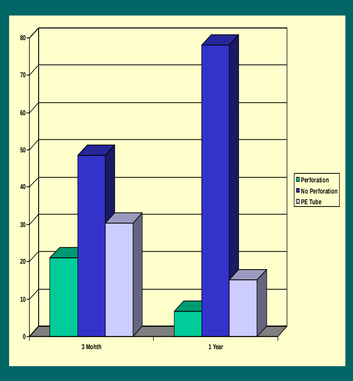

Figure 1.b Outcome for Phenol.

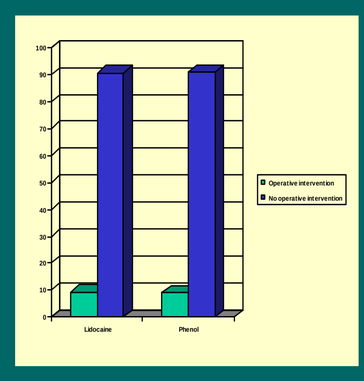

Figure 1.c Surgical Intervention.

	Lidocaine (n=30)		Phenol (n=46)		
3 Month	Frequency	Percent	Frequency	Percent	P-value
Perforation	10	33.3	14	30.4	0.81
No Perforation	20	66.7	32	68.6	
1 Year					
Perforation	6	20.7	4	8.0	0.16
No Perforation	23	79.3	46	92.0	

Figure 2. Comparison of lidocaine versus phenol for tympanic membrane perforation.

Conclusions

In this study, we retrospectively compared the rates of TM perforation under local anesthesia using either lidocaine or phenol. Three months after the completion of treatment with the microwick, the perforation rates of both the lidocaine group and the phenol group were similar (66.7% vs. 68.6%). In fact, at the one year follow-up exams, the perforation rates in the phenol group were lower than the lidocaine group (20.7% vs. 8.0%). In addition, there was no differences in the need for operative repair of perforation for either group. Based on this data, topical phenol appears to be a safe method of local anesthesia for PE tube insertion without significant increased risk of persistent perforation/failure of TM healing.
One additional finding of this study indicated that at three months and one year the rates of retained PE tube were higher for the phenol group than the lidocaine group. In light of the fact that most PE tubes are placed to improve symptoms of eustachian tube dysfunction, this could be a definite advantage of phenol versus lidocaine.
Our study has indicated that application of phenol to the TM for myringotomy is a safe and advantageous method of local anesthesia.

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