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A Comparative Study of Tympanoplasty with or without Mastoidectomy in Tubotympanic Type of Chronic Suppurative Otitis Media

Dr. Zubaidul Haque[1*], Dr. Dipan Kumar Sarker[2], Dr. Abdul Karim[3], Dr. Md. Oli Ullah[4], Dr. Md. Miraz Ali[5], Dr. Md. Quamruzzaman[6]

[1]Assistant Professor (ENT), Netrokona Medical College, Netrokona, Bangladesh
[2]Associate Professor (ENT), TMSS Medical College, Bogura, Bangladesh
[3]Assistant Professor (ENT), Sheikh Hasina Medical College, Jamalpur, Bangladesh
[4]Jr Consultant (ENT), Netrokona Sadar Hospital, Netrokona, Bangladesh
[5]Assistant Professor (Pediatrics) Netrokona Medical College, Netrokona, Bangladesh
[6]Junior Consultant (ENT), 250 beded General Hospital, Pabna, Bangladesh

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***Corresponding author:** Dr. Zubaidul Haque
Assistant Professor (ENT), Netrokona Medical College, Netrokona, Bangladesh

Abstract **Original Research Article**

Background: One of the most frequent ear illnesses in underdeveloped countries is chronic suppurative otitis media (CSOM). In the treatment of CSOM, otolaryngologists debate whether to perform tympanoplasty with or without cortical mastoidectomy. ***Objective:*** To compare the outcome of tympanoplasty with or without cortical mastoidectomy in the treatment of tubotympanic type chronic suppurative otitis media. ***Methods:*** This comparative study was carried out in the Department of Otolaryngology - Head and Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka from July 2017 to June 2019 over a period of 02 years. A total number of 60 patients who underwent type 1 tympanoplasty with or without cortical mastoidectomy were enrolled in this study. After enrollment the condition of the pinna, preauricular region, postauricular region and external auditory cannal were examined. On otoscopy, site and size of perforation of tympanic membrane, condition of the rest of the tympanic membrane, condition of the middle car mucosa and the ossicles were also examined. Tuning fork tests, test for facial nerve integrity and fistula test were performed. Hearing level was assessed by pure tone audiometry with masking. Enrolled patients were grouped into two groups. Patients who underwent type- 1 tympanoplasty alone kept in group A and who underwent type 1 tympanoplasty with cortical mastoidectomy kept in group B. Complete blood count, blood urea, serum creatinine, random sugar, ECG and X-ray chest P/A view were done routinely. ***Results:*** Females were 76.7% in group-A and 53.3% in group-B. All patients were of age between 16 to 60 years and most of them were in the age group of 21-30 years. Majority of the patients were from rural area and maximum patients were from middle class family. In most of the patients unilateral ear involvement was observed. Perforation site was central malleolar in maximum cases followed by anterior central and posterior central. Perforation size was medium in maximum cases followed by small, large and subtotal. Improvement of bone conduction threshold was found higher in group-B (1.60 ± 3.53) than group-A (1.32 ± 5.07) ($p>0.05$). Improvement of air conduction threshold was found higher in group-B (13.32 ± 11.34) than group-A (10.28 ± 7.45) ($p>0.05$). Improvement of air bone gap was found higher in group-B (11.72 ± 11.21) than group-A (8.95 ± 6.40) ($p>0.05$). Success rate of graft uptake was almost same in both the groups. ***Conclusion:*** Tympanoplasty with cortical mastoidectomy is clinically better than tympanoplasty alone but not statistically significant in the treatment of tubotympanic type chronic suppurative otitis media.

Keywords: Tympanoplasty, mastoidectomy, chronic suppurative otitis media.

INTRODUCTION

Chronic suppurative otitis media (CSOM) is a chronic disease with a slow onset that can cause severe destruction of the middle ear structure, resulting in deafness and discharge for more than three months.Since the prehistoric period, CSOM has been a major cause of middle ear disease, and it is one of the most common ear diseases in developing countries [1].

In many underdeveloped countries, including Bangladesh, this is one of the most prevalent juvenile health diseases [2]. Its prevalence influenced by socioeconomic and racial characteristics.

Overcrowding, inadequate housing, poor hygiene, lack of breastfeeding, poor nutrition, weakened immune system, passive smoking, frequent upper respiratory tract infection, high rates of nasopharyngeal colonization with potentially pathogenic bacteria, and insufficient or unavailable health care have all been linked to high rates of CSOM [3]. Its incidence is very high in Bangladesh because of lower socio-economic condition, overcrowding, poor nutrition and lack of health education [4-6].

CSOM is characterised by recurrent or persistent ear discharge (otorrhoea) over 2 to 6 weeks through a perforation of the tympanic membrane. It is classified into two typestubotympanic (mucosal) and atticoantral type (squamosal).

Tympanoplasty is a surgical procedure used to remove disease from the middle ear and reconstruct the hearing mechanism, with or without tympanic membrane grafting [7]. The range of hearing loss brought on by TM perforation is 0–40 dB. More than 90% of patients normally get successful perforation closure and hearing improvement by tympanoplasty [8].

Mastoid plays an important role in middle ear aeration and pressure regulation. Cortical mastoidectomy is a surgical procedure that removes disease from the mastoid antrum, air cell system, and aditus and antrum while leaving the bony external auditory canal wall intact and without disturbing the existing middle ear contents [9].

Simple mastoidectomy is most frequently performed as a first step in a variety of otologic procedures and for acute coalescent mastoiditis (Sana *et al.,* 2012) [10]. Most mastoidectomies today are either done as part of more complicated otologic surgeries or are done for serious chronic ear diseases [11].

Cortical mastoidectomy along with tympanoplasty has long been thought of as the surgical procedure of choice because there has been a clinical impression that lack of an aerating mastoidectomy at the time of the initial tympanoplasty may be a significant source of failure in patients with chronic non-cholesteatomatous otitis media [12].

The role of mastoidectomy in tympanoplasty is debatable. The purpose of this study was to compare the outcome of tympanoplasty with or without cortical mastoidectomy in the treatment of tubotympanic type chronic suppurative otitis media.

METHODS

This two-year study was carried out in the Department of Otolaryngology - Head and Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka from July 2017 to June 2019. A total number of 60 patients who underwent type 1 tympanoplasty with or without cortical mastoidectomy were collected from the Department of Otolaryngology - Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka. For this study the patients, admitted for type-1 tympanoplasty and type-1 tympanoplasty with cortical mastoidetonny were examined thoroughly after taking detailed history. During examination the condition of the pinna, preauricular region, postauricular region and external auditory cannal were noted. On otoscopy, site and size of perforation of tympanic membrane, condition of the rest of the tympanic membrane, condition of the middle car mucosa and the ossicles were also noted. Perforation was categorized as small, medium, large and subtotal on the basis of the surface area of the tympanic membrane. Tuning fork tests, test for facial nerve integrity and fistula test were performed in every case. Hearing level was assessed by pure tone audiometry with masking. Pure tone audiometry was done in the Audiometry Unit at BSMMU. Admitted patients were grouped into two groups. Patients who underwent type- 1 tympanoplasty alone kept in group A and who underwent type 1 tympanoplasty with cortical mastoidectomy kept in group B. X- ray mastoid & X-ray paranasal sinuses were done to exclude local pathology. Fitness for general anesthesia like complete blood count, blood urea, serum creatinine, random sugar, ECG and X-ray chest P/A view were done routinely.

All of group A & group B patients were operated on under general anaesthesia. In group A patients, approaches were postauricular, graft material was temporalis fascia and underlay technique used in all cases. In group B patients, the approach was postauricular, graft material used temporalis fascia and underlay technique used in every cases. Micro ear surgery was performed by operating microscope. Postoperatively the patients followed up at weekly interval for the first month, then monthly up to 3 months and after that as needed. At the follow up condition of the wound, condition of the external auditory canal and the appearance of newly formed tympanic membrane were noted. Outcome of surgery was regarded as successful if the car was dry and tympanic membrane intact and mobile, criteria of the newly formed intact tympanic membrane regarded as (1) sealed scaled and no perforation, (2) Epithelialization, and (3) Vascularity developed in then newly formed tympanic membrane. Pure tone Audiometric test was performed before operation and after three months and onward after operation according to ISO standard. The hearing thresholds measured at 250, 500, 1000 and 2000 Hz. Air and bone conduction thresholds were determined throughout with appropriate masking techniques. Hearing improvement was assessed by closure of the air-bone gap. Graft taken was assessed by as completely taken, incompletely taken & not taken or failure.

Relevant data were collected in a pre-designed data collection sheet for each patient. All data were checked and verfied thoroughly to reduce the inconsistency. Statistical analysis was performed using descriptive and inferential statistics using Chi-square test, and Student's t-test and software used in the analysis was Excel16.0 version and $P < 0.05$ was considered statistically significant ($P < 0.05$).

RESULTS

Table 1: Socio-demographic profile of the study subjects (N=60)

Parameters	Group A (n=30)	Group B (n=30)
Age (years)		
16 - 20	6 (20.0)	8 (26.7)
21 – 30	14 (46.7)	13 (43.3)
31-40	10 (33.3)	9 (30.0)
Mean±SD	26.26±6.49	24.86±6.78
Min - max	16.0-40.0	16.0- 38.0
Sex		
Male	7 (23.3)	14 (46.7)
Female	23 (76.7)	16 (53.3)
Level of literacy		
Illiterate	1 (3.3)	2 (6.7)
Primary	6 (20.0)	5 (16.7)
Secondary	7 (23.3)	5 (16.7)
Higher secondary	6 (20.0)	7 (23.3)
Graduate and above	10 (33.3)	11 (36.7)
Occupation		
Student	12 (40.0)	13 (43.3)
Housewife	10 (33.3)	7 (23.3)
Service	4 (13.3)	8 (26.7)
Residence		
Urban	6 (20.0)	10 (33.3)
Rural	24 (80.0)	20 (66.7)
Socioeconomic status		
Low	7 (23.3)	8 (26.7)
Middle	18 (60.0)	19 (63.3)
High	5 (16.7)	3 (10.0)

Females were predominant than male. Females were 76.7% in group-A and 53.3% in group-B. All patients were of age between 16 to 60 years and most of them were in the age group of 21-30 years. Most of the patients were students (in group-A 40.0% and in group-B 43.3%). Majority of the patients were from rural area (in group-A 80.0% and in group-B 66.7%). Maximum patients were from middle class family (in group-A 60.0% and in group-B 63.3%) followed by poor family (in group-A 23.3% and in group-B 26.7%) (Table 1).

Table-2: Ear involvement, ear operated site, perforation site and perforation size of the study subjects (N=60)

Parameters	Group A	Group B
Ear involved		
Unilateral	21 (70.0)	18 (60.0)
Bilateral	9 (30.0)	12 (40.0)
Ear operated		
Right	7 (23.3)	16 (53.3)
Left	23 (76.7)	14 (46.7)
Perforation site		
Anterior central	11 (36.7)	12 (40.0)
Posterior central	4 (13.3)	4 (13.3)
Central malleolar	15 (50.0)	14 (46.7)
Perforation size		
Small	8 (26.7)	7 (23.3)
Medium	11 (36.7)	12 (40.0)
Large	6 (20.0)	7 (23.3)
Subtotal	5 (16.7)	4 (13.3)

In most of the cases unilateral ear involvement was observed (70.0% in group-A and 60.0% in group-B). Operated ear was left ear in most of the cases (76.7% in group-A and 46.7% in group-B). Perforation site was central malleolar in maximum cases (50.0% in group-A and 46.7% in group-B) followed by anterior central and posterior central. Perforation size was medium in maximum cases (36.7% in group-A and 40.0% in group-B) followed by small, large and subtotal (Table 2).

Table-3: Effect of surgery on hearing threshold

Hearing threshold	Group A (n=30) (Mean±SD)	Group B (n=30) (Mean±SD)	p-value
Bone conduction threshold (db)			
Pre-treatment	10.00 ± 5.42	11.74 ± 4.42	0.179
Post treatment	8.68 ± 4.29	10.14 ± 3.70	0.162
Improvement	1.32 ± 5.07	1.60 ± 3.53	0.809
Air conduction threshold (db)			
Pre-treatment	39.17 ± 9.30	39.78 ± 8.76	0.798
Post treatment	28.90 ± 8.77	26.45 ± 9.19	0.297
Improvement	10.28 ± 7.45	13.32 ± 11.34	0.224
Air-bone gap (dB)			
Pretreatment	29.17 ± 7.80	28.03 ± 7.75	0.573
Post treatment	20.22 ± 6.67	16.31 ± 7.61	0.039
Improvement	8.95 ± 6.40	11.72 ± 11.21	0.246

Pre-treatment bone conduction threshold was 10.00 ± 5.42 dB and 11.74 ± 4.42 dB in Group-A and group-B respectively. It was reduced to 8.68 ± 4.29 dB and 10.14 ± 3.70 dB in group-A and group-B respectively (p>0.05). Improvement of bone conduction threshold was found higher in group-B (1.60 ± 3.53) than group-A (1.32 ± 5.07) (p>0.05). Pre-treatment air conduction threshold was 39.17 ± 9.30 dB and 39.78 ± 8.76 dB in Group-A and group-B respectively. It was reduced to 28.90 ± 8.77 dB and 26.45 ± 9.19 dB in group-A and group-B respectively (p>0.05). Improvement of air conduction threshold was found higher in group-B (13.32 ± 11.34) than group-A (10.28 ± 7.45) (p>0.05). Pre-treatment air bone gap was 29.17 ± 7.80 dB and 28.03 ± 7.75 dB in Group-A and group-B respectively. It was reduced to 20.22 ± 6.67 dB and 16.31 ± 7.61 dB in group-A and group-B respectively (p<0.05). Improvement of air bone gap was found higher in group-B (11.72 ± 11.21) than group-A (8.95 ± 6.40) (p>0.05).

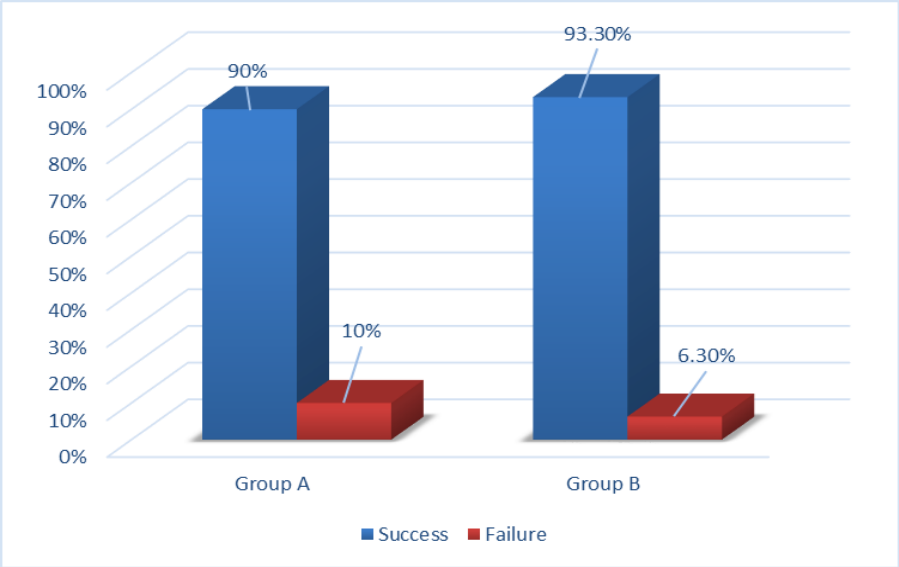

Figure 1: Graft uptaken by the study subjects (N=60)

There was no significant difference in success rate of graft uptake between the two groups p=1.

DISCUSSION

In this study, pateints between 16 years to 60 years were enrolled. It was revealed that maximum number of the patients in tympanoplasty alone group (14 patients, 46.7%) and tympanoplasty with mastoidectomy group (13 patients, 43.3%) were in the third decade.This results were comparable with other studies [13-15]. Females were predominant in both the groups, 23 patients (76.7%) in tympanoplasty alone group and 16 patients (53.3%) in tympanoplasty with

mastoidectomy group. This result was correlated with the study of Girde *et al.*, [16] and Lasisi *et al.*, [15]. There was no definitive evidence for the higher incidence in the female patients in the literature. Left ear was operated more i.e. 23 cases (76.7%) in tympanoplasty alone group and 14 cases (46.7%) in tympanoplasty with mastoidectomy group. This result was correlated with Girde *et al.*, [16]. No specific reason was found for more involvement of left ear. Small perforation was seen in 8 patients (26.7%), medium sized perforation in 11patients (36.7%), large perforation in 6patients (20.0%) and subtotal perforation in 5 patients (16.7%) in tympanoplasty alone group, similarly small perforation was seen in 7 patients (23.3%), medium perforation in 12 patients (40.0%), large perforation in 7 patients (23.3%) and subtotal perforation in 4 patients (13.3%) in tympanoplasty with mastoidectomy group. Moderately-sized perforation was found to be the most common. Biswas *et al.*, [14] and Kaur *et al.*, [17] reported moderately-sized perforation to be the most common. This result was comparable with previous studies [17-19].

In this study, it is worth noted that outcome of hearing gain in terms of post-operative mean air –bone gap was 16.31 ± 7.61 dB in tympanoplasty with mastoidectomy and 20.22 ± 6.67 dB in tympanoplasty alone.There was significant difference between the two groups. Improvement of air bone gap was found higher in tympanoplasty with mastoidectomy (11.72 ± 11.21) than tympanoplasty alone (8.95 ± 6.40), but there was no siginifcant difference between the two groups. Similar finding was observed in the study of Agrawal and Bhargava [20], in their study Improvement of air bone gap was found higher in tympanoplasty with mastoidectomy (12.05 ± 4.98) than tympanoplasty alone (9.41 ± 5.73), but there was no siginifcant difference between the two groups.

In this study, there was no significant difference in failure rate of graft uptake between the groups (10.0% vs 6.7%). These results were comparable with other studies [14, 15, 21, 22]. Balyan *et al.*, [23] (1997) commented that treated by means of tympanoplasty with and without mastoidectomy had no significant difference in graft failure rates or hearing results. They also concurred that the addition of mastoidectomy had increased effort and risk to the surgery. In a study conducted by Saha *et al.*, [24], Type 1 tympanoplasty with cortical mastoidectomy showed excellent surgical success rate (100%) but lesser degree of improvement of hearing.

CONCLUSION

It can be concluded that Mastidectomy gives no statistically significant benefit over tympanoplasty in tubotympanic type of CSOM as regards to graft success rate and hearing gain.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests regarding the publication of this paper.

REFERENCES

1. Bhusal, C. L., Guragain, R. P., & Shrivastav, R. P. (2006). Size of typmanic membrane perforation and hearing loss. *JNMA; journal of the Nepal Medical Association*, *45*(161), 167-172.
2. Berman, S. (1995). Otitis media in developing countries. *Pediatrics*, *96*(1), 126-131.
3. WHO/CIBA Foundation workshop report, Prevention of hearing impairment from chronic otitis media.UK 19–21 Nov 1996.
4. Shaheen, M. M., Raquib, A., & Ahmad, S. M. (2012). Prevalence and associated socio-demographic factors of chronic suppurative otitis media among rural primary school children of Bangladesh. *International journal of pediatric otorhinolaryngology*, *76*(8), 1201-1204.
5. Biswas, A. C., Haq, A. H. M. Z., Khan, F. A., Alauddin, M., & Dutta, P. G. (2005). A comparative study of prevalence of chronic suppurative otitis media (CSOM) between rural and urban school going children. *Bangladesh J Otorhinolaryngol*, *11*(12), 17-21.
6. Rahim, M. M., Joarder, M. A. H., Taous, A., Hossain, D., Ahmed, M. U., & Sayeed, A. H. M. N. (2006). Prevalence of CSOM in selected rural and urban community of Bangladesh. *Bangladesh J Otorhinolaryngol*, *12*, 1-6.
7. Rahim, M. M., Joarder, M. A. H., Taous, A., Hossain, D., Ahmed, M. U., & Sayeed, A. H. M. N. (2006). Prevalence of CSOM in selected rural and urban community of Bangladesh. *Bangladesh J Otorhinolaryngol*, *12*, 1-6.
8. Frootko, N. J. (1997). Reconstruction of the middle ear", In: *Scott Browns Otolaryngol*, 3(11), 1- 29.
9. Gross, N. D., & McMenomey, S. O. (2003). Aural Complication of Otitis Media. Glasscock-Shambaugh Surgery of the Ear, *5th edition, Ontario, Elsevier*, 22, 432.
10. McGrew, B. M., Jackson, C. G., & Glasscock III, M. E. (2004). Impact of mastoidectomy on simple tympanic membrane perforation repair. *The Laryngoscope*, *114*(3), 506-511.
11. Sanna, M., Sunose, H., & Mancini, F. (2012). Simple Mastoidectomy. Middle Ear and Mastoid Microsurgery, *2nd edition, New York, Thieme*, 12, 245.
12. Adunka, O. F., & Buchman, C. A. (2011). Mastoidectomy. Otology, Neurotology and Lateral Skull Base Surgery, *1st edition, New York, Thieme*, 5, 295-96.
13. Alper, C. M., Kitsko, D. J., Swarts, J. D., Martin, B., Yuksel, S., Cullen Doyle, B. M., ... & Doyle, W. J. (2011). Role of the mastoid in middle ear pressure regulation. *The Laryngoscope*, *121*(2), 404-408.

14. Khan, F. K., Rejee, R. E., & Sajilal, S. M. (2014). Assessment of factors affecting the outcome of myringoplasty and type-1 tympanoplasty. *Int J Biomed Res*, *5*(5), 340-3.
15. Biswas, S. S., Hossain, M. A., Alam, M. M., Atiq, M. T., & Al-Amin, Z. (2010). Hearing evaluation after myringoplasty. *Bangladesh Journal of Otorhinolaryngology*, *16*(1), 23-28.
16. Lasisi, A. O., & Afolabi, O. A. (2008). Mastoid surgery for chronic ear: a ten year review. *Internet J Head Neck Surg*, *2*(2), 13.
17. Girde, H., & Code, Q. R. A Comparative Evaluation between Tympanoplasty with or Without Cortical Mastoidectomy. *Small*, *43*(24), 40.
18. Kaur, M., Singh, B., Verma, B. S., Kaur, G., Kataria, G., SinghS Kansal, P., & Bhatia, B. (2014). Comparative evaluation between tympanoplasty alone and tympanoplasty combined with cortical mastoidectomy in non cholesteatomatous chronic suppurative otitis media in patients with sclerotic bone. *ISOR-JDMS*, *13*(6), 40-45.
19. Singha, V., & Debbarma, A. (2015). Type 1 tympanoplasty with cortical mastoidectomy: results and complications. *Journal of Evolution of Medical and Dental Sciences*, *4*(82), 14348-14354.
20. Nagle, S. K., Jagade, M. V., Gandhi, S. R., & Pawar, P. V. (2009). Comparative study of outcome of type I tympanoplasty in dry and wet ear. *Indian Journal of Otolaryngology and Head & Neck Surgery*, *61*(2), 138-140.
21. Agrawal, A., & Bhargava, P. (2017). Comparative evaluation of tympanoplasty with or without mastoidectomy in treatment of chronic suppurative otitis media tubotympanic type. *Indian Journal of Otolaryngology and Head & Neck Surgery*, *69*(2), 172-175.
22. Mishiro, Y., Sakagami, M., Kondoh, K., Kitahara, T., & Kakutani, C. (2009). Long-term outcomes after tympanoplasty with and without mastoidectomy for perforated chronic otitis media. *European archives of oto-rhino-laryngology*, *266*(6), 819-822.
23. Krishnan, A., Reddy, E. K., Chandrakiran, C., Nalinesha, K. M., & Jagannath, P. M. (2002). Tympanoplasty with and without cortical mastoidectomy—a comparative study. *Indian journal of otolaryngology and head and neck surgery*, *54*(3), 195-198.
24. Balyan, F. R., Celikkanat, S., Asian, A., Taibah, A., Russo, A., & Sanna, M. (1997). Mastoidectomy in noncholesteatomatous chronic suppurative otitis media: is it necessary?. *Otolaryngology—Head and Neck Surgery*, *117*(6), 592-595.
25. Saha, A. K., Munsi, D. M., & Ghosh, S. N. (2006). Evaluation of improvement of hearing in type I tympanoplasty & its influencing factors. *Indian Journal of Otolaryngology and Head and Neck Surgery*, *58*(3), 253-257.