

## ABSTRACT

**Background:** Otitis media with effusion is characterized by accumulation of fluid in the middle ear in absence of acute inflammation and it is the most common cause of acquired hearing loss in children, and may negatively affect language development failure of medical treatment of middle ear effusion frequently require myringotomy and tympanostomy tube insertion.

**Objectives:** To determine tympanostomy tube complications of tube in children with chronic otitis media with effusion who were treated with Shah Grommet tube insertion.

**Methods:** The Medical records of 162 ears of 87 children (52 male and 35 female) were reviewed respectively, the patients ages were between 3 to 16 years old (mean age =8.11 years), patient were followed for 6-66 months (mean 23.3) after tympanostomy tube insertion. Tube extrusion time was also reviewed in all patients, and the indication for surgery was chronic middle ear effusion.

**Results:** Otorrhea accrued in nine ears (5.6%), granulation tissue was seen in 2 ears (1.2%), myringosclerosis in (34.6%) persistent perforation (5.6%), atrophy (23.5%) retraction (16.7%) and medial displacement 1.2% the average extrusion time was 8.5 month ( $\pm 4.6$ ).

**Conclusions:** complications of tympanostomy tube insertion are common and the most common are otorrhea myringosclerosis, atrophy but they are generally insignificant consequently in majority of these complications there is no need for management.

**Keywords:** Otitis media with effusion ,tympanostomy tube shah type.

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## INTRODUCTION

Otitis media with effusion (OME) is characterized by accumulation of fluid in the middle ear, in the absence of acute inflammation. The condition is the most common cause of acquired hearing loss in children and may negatively affect language development. Failure of medical treatment of middle ear effusion frequently requires myringotomy and tympanostomy tube insertion <sup>(1)</sup>. This operation is one of the most common surgical procedures and usually requires general anesthesia in children although otolaryngologists consider conservative treatment as first line of management of otitis media with effusion <sup>(2)</sup>.

Many types of tympanostomy tubes are available commercially. But, complication rates of various tubes have been reported <sup>(3-7)</sup>. The most common complications of tympanostomy tube insertion were otorrhea, atrophy and myringosclerosis <sup>(2-8)</sup>. In this study, we tried to determine the specific complications of Shah Grommet tympanostomy tube insertion.

## METHODS

In this study, patients with chronic OME who underwent tympanostomy tube

insertion in the Department of Otorhinolaryngology of AL-Kindy Teaching Hospital between July 2008 and November 2013 were reviewed retrospectively. In all cases the indication for operation was chronic OME. The diagnoses were done by otoscopic examination, tympanometric and pure-tone audiometric measurements before operation. During otoscopy any retraction, increased vascularization, tympanic membrane dullness or loss of opalescence, fluid levels, or air bubbles were recorded. Patients with otoscopic signs of OME, type B tympanogram and any conductive hearing loss were considered positive for OME, Operation was performed on patients whose OME, lasted more than 3 months, all cases were examined postoperatively at 1 week and 1 month. Further control examinations have been made in our clinic once in every 3 months until extrusion of tubes, After extrusion of tubes, patient with perforation and retraction were continued to be followed up for 3 month periods.

In this study, the operated cases were called for control between January 2014 and May 2014 in order to determine

presence or absence of complications after tympanostomy tube extrusion, final control otomicroscopic examinations, tympanometric and audiometric evaluations were performed on all patients. Two cases with craniofacial anomalies Down's syndrome and cleft palate, ten cases that underwent only myringotomy instead of tympanostomy tube insertion and seven cases that could not be called for control were excluded from the study, Also 11 patients whose tympanostomy tube was still in place were excluded from the study because we can't determine complication occurrence until extrusion grommets. Patient's age, sex, surgical procedure performed, duration of tympanostomy tube in place and complications were recorded. Follow up period which was defined as the period

## DISCUSSION

Tympanostomy tube insertion is a commonly performed surgical operation in children. various tympanostomy tubes have been used in the operation Short – term tubes are Shepard, Armstrong, Shah, Sheey, Reuter Bobbin, Donaldson and Paparella type I, although long term tubes are Paparella type I, Butterfly, Per-Lee, and Goode T-tubes<sup>(3)</sup>.

Otorrhea is one of the most common complications after tympanostomy tube insertion, The incidence varies from 0.8 to 8.3% (4,9) Early otorrhea occurs within 2-4 weeks postoperatively, and delayed otorrhea seems more frequent and occurs after first month postoperatively<sup>(5)</sup>. Ah-Tye et al.<sup>(9)</sup> showed an incidence reaching 74.8% after 12 months and 83% after 18 months of the children who developed one or more episodes of otorrhea. Kay et al.<sup>(3)</sup> found early otorrhea in 16% of patients and delayed otorrhea in 26% of patients in the meta-analysis. Long-term tubes are generally associated with a higher incidence of otorrhea. The incidence of otorrhea rates were: 32.5% for long-term tubes, and 14.8% for short-term tubes<sup>(3)</sup>. Several factors were blamed in the literature for the occurrence of otorrhea such as younger age, contamination from the external auditory canal during Surgery, upper respiratory tract infection or

between the insertion time and final control time, was 6-66 months (median 23.3 ± 14.9).

## RESULT

The study was completed with 162 ears of 87 children. They are 52 boys (59.8%) and 35 girls (40.2%) with ages ranging between 3 and 16 years (mean age 8.1 ± 3.1 years). Unilateral tympanostomy tube insertion was performed in 12 patients (13.8%). In 80 patients (92%) adenoid-ectomy or adenotonsillectomy were performed with tympanostomy tube insertion. Nine patients (10.3%) had multiple tympanostomy tubes placed while 78 patients (89.7%) had first tubes placed. Seven patients had second tubes placed and two patients had third tubes placed. In

infected middle ear effusions<sup>(4,5,10)</sup> Otorrhea is not serious in most cases. The management of otorrhea usually include a topical preparation of otic drops containing an antibiotic steroid combination with or without oral antibiotics, after culture /sensitivity test of discharge a related meta- analysis found a 52% reduction of post-tympanostomy tube otorrhea when antibiotic prophylaxis was used<sup>(11)</sup>. In this study, 5.6% of ears had otorrhea. Otorrhea occurred early in most of the ears within the first 4 weeks.

All of them were treated with combination of systemic antibiotic and topical antibiotic-corticosteroid drugs. The mean incidence rate of granulation tissue occurring after tympanostomy tube insertion is less than 5%<sup>(3)</sup>. This complication rate was 0.3% for Shepard tubes, and 13% for T-tubes<sup>(4)</sup>. It is a predisposing factor for otorrhea<sup>(5)</sup> Medical treatment includes the use of topical antibiotic steroid combination with or without oral antibiotics or topical chemical cauterization with silver nitrate solution<sup>(5)</sup>. In more serious cases the tube may need removal (1.8%)<sup>(3)</sup>. In this study, granulation tissue was Seen in two ears (1.2%), and treated with combination of systemic antibiotic and topical antibiotic corticosteroid drugs.

Perforation can be seen after surgical or spontaneous tube extrusion, and the rate of

perforation in spontaneously extruded tubes<sup>(12)</sup>. The majority of these perforations heal spontaneously, while persistent perforation was reported as a approximately 2.2% for short-term tubes and 16.6% for long-term tubes<sup>(3)</sup>. In other studies, the perforation rate was found in 16% for Paparella type 23% for Reuter bobbin, 45% for Sheehy, and 35% for T-tube<sup>(12)</sup>. In the same study, the perforation rate was noted as 24% for children with a history of less than 3 sets of tubes, while it was 42% for children with a history of 3 or more sets of tubes<sup>(12)</sup>. They found that prolonged ventilation tube retention beyond 36 months resulted in an increased perforation rate after Surgical removal, In our study in only one ear of nine ears with persistent perforation was after second tympanostomy tube insertion was performed, while in the other eight ears with persistent perforation first tympanostomy tube insertion were performed. To treat persistent perforation after tube removal different types of patching materials including paper, absorbable gelatin film, and fat plug were used.

Satio et al.<sup>(13)</sup> showed a decrease from 13.2 to 3.3% when using paper patching. However, Nichols et al.<sup>(12)</sup> and El-Bitar et al.<sup>(14)</sup> did not find any benefits from patching. In our study, perforation was found in 8% of ears, but, persistent perforation was in 5.6% of ears. We did not perform patching to any of them, further surgery is planned on all of them.

Myringosclerosis signifies an increase in collagen fibrils in the lamina propria, with hyaline degeneration and calcification and is a frequent complication of tympanostomy tube insertion. Foreign body reaction, fibrous hyperplasia and inflammatory changes due to the tube, haemorrhage and the liberation of free haemoglobin between the layers of the tympanic membrane after myringotomy are blamed for the development of tympanosclerosis after insertion of a tympanostomy tube<sup>(15)</sup>. In this study, myringosclerosis was the most common complication of tympanostomy tube insertion and the myringosclerosis incidence rates was 34.6% were similar to 32 and 40.4% reported by Kay et al.<sup>(3)</sup> and

Johnston et al.<sup>(8)</sup>, respectively, It was usually located on the inferior quadrants of tympanic membrane, we did not detect any hearing loss due to myringosclerosis (by PTA & Tympanometry).

Atrophy may contribute to more serious complications, such as spontaneous perforations<sup>(5, 16)</sup>. Minor atrophic scars and thickening of the pars tensa of tympanic membrane are more related to middle ear disorders, while Segmental atrophy seems to be directly related to the tube insertion<sup>(5, 16)</sup>. In Johnston et al.<sup>(8)</sup> and Daly et al.<sup>(6)</sup> studies the most common complication of tympanostomy tube insertion was atrophy of tympanic membrane, and was present in 74.7 and 67%, respectively, Maw and Bawden<sup>(16)</sup> found that 22% of tubed ears and 5% of nontubed ears had localized pars tensa atrophy at 10 years of follow-up.

In our study, atrophy rate was 23.5%, and this rate was similar to 24.6% of the meta-analysis by Kay et al.<sup>(3)</sup>. We did not find any hearing loss.

Retraction rate was reported as 38% at 6 years of follow up<sup>(6)</sup>. Diacova and McDonald<sup>(17)</sup> found that 32% of tube ears and 28 % of conservatively treated ears had complete retractions. According to our finding the incidence of retraction (16.7%) was lower than these studies.

Cholesteatoma is extremely rare due to tympanostomy tube insertion<sup>(3, 5)</sup>, but it is the most serious complication after tympanostomy tube insertion our cases had no cholesteatoma. Medial displacement of tympanostomy tubes are very rare<sup>(3, 18, 19)</sup>. Meta-analysis indicated a 0.5% rate of medial displacement of tympanostomy tubes<sup>(3)</sup>. Green et al.<sup>(19)</sup> reported three cases of medial displacement of T-tubes. They did not remove the T-tubes in two cases because there was no effusion and conductive hearing loss in the follow-up examinations, In the other case removed the T-tube because of effusion and conductive hearing loss, we determined in two ears (1.2%) of two patients with medial displacement of grommets, We did not remove the grommet in one of them because the patient was asymptomatic In the other one an effusion was observed and the grommet was removed.

## CONCLUSION

Complications of tympanostomy tube insertion are common Myringosclerosis, tympanic membrane atrophy and otorrhea are most frequently shown of these complications. But they are generally insignificant consequently, in the majority of these complications there is no need for the management.

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