

Abstracts

Podium: Otology 2 / Vestibular

Monday, June 8, 2015 @ 16:00-17:15

Post Traumatic Cochleovestibular Loss from Assaults Causing Head Injury in the Workplace – O. Ilan, M.I. Syed, J.A. Rutka, Toronto, ON

Learning Objectives

1. By the end of the session the listener will: be aware of the trends in demographics of head injury caused by assault at work.
2. Know the long term neurotological consequences of head injury from assault.

Background: Violence in the workforce is uncommon. Head injury from an assault in the workplace however can be both physically and psychologically traumatic for the person assaulted. **Objective:** Our aim was to assess the trends in the frequency of head injury caused by assault at work, the demographics of the people assaulted and the professions where this was most prevalent. We also assessed vestibulocochlear dysfunction in this group of patients compared to the others with head injury that were not assaulted. **Methods:** 3438 consecutive patients referred from the Workplace Safety and Insurance Board (WSIB) of Ontario who sustained a work related head injury were assessed between 1987-2014 **Results:** 147 workers experienced a head injury from a workplace assault (47% were females compared to 28% females ($p < 0.0001$) in the non-assaulted group). Nurses were the professionals most likely to sustain a head injury from an assault (13.6%) followed closely by personal support workers (13%). The percentage of individuals in these professions was significantly higher in the assaulted group than in the non-assaulted group ($p < 0.0001$ for both). Cochleovestibular loss was diagnosed in 2.7% of the assaulted patients, cochlear loss in 6.8% and vestibular loss in 14.3%. The average time from injury to initial assessment was 13.7 months. **Conclusions:** Women were more prone to assault than men in the work place. Nurses and PSW's are the most likely professions to be the victims of physical attack. A quarter of workers assaulted in the work place will have long term neurotological loss after head injury.

Olfactory and Cochleovestibular Dysfunction After Head Injury in the Workplace – O. Ilan, M.I. Syed, J.A. Rutka, Toronto, ON

Learning Objectives

1. Following this presentation the listener will: be able to understand the relation between head injury and olfactory dysfunction.
2. Be familiar with the relation of olfactory dysfunction and cochleovestibular dysfunction after head injury.
3. Know at what severity level of head injury to suspect possible injury to the olfactory function.

Objective: To determine the incidence of olfactory and cochleovestibular dysfunction in workers who sustained a head injury in the work place, to define its relationship to the site and severity of head injury and other associated symptoms. We also looked to assess whether those patients who sustained olfactory dysfunction were more likely to sustain a concurrent cochleovestibular injury. **Methods:** 3438 consecutive patients referred from the Workplace Safety and Insurance Board (WSIB) of Ontario who sustained a work related head injury were assessed between 1987-2014 for olfactory and cochleovestibular dysfunction at a tertiary referral university hospital. **Results:** Olfactory dysfunction (OD) was identified in 413 of 3438

patients (12.01%) of which 9.34% had anosmia and 5.35% hyposmia/dysosmia. The most common vectors for blows causing OD were from the back 35.6% , front 28.1% and side 25.4%. A frontal blow applied to the skull was more likely to result in OD than other directions [p=0.0002] when compared to patients without. In those with olfactory dysfunction an associated skull fracture occurred in 37.05% of patients and a CSF leak in 4.12% which was a significantly higher rate when compared to those without OD (<0.0001) . Patients with OD had a higher incidence of cochlear and vestibular loss (19.85% and 20.58% respectively) compared to those without OD (14.3% and 17.1% respectively). **Conclusions:** Post traumatic olfactory dysfunction is statistically more likely to occur in patients with a severe head injury and more likely to from a frontal blow to the skull. Cochleovestibular dysfunction is likely to appear concurrently with olfactory dysfunction.

Neurotological Presentation of Electrical Injuries in the Workforce: A 30 Year Review – C. Wuesthoff, O. Ilan, J.A. Rutka, Toronto, ON

Learning Objectives

1. Attendees will be knowledgeable in the neurotological presentation of an uncommon injury.
2. Attendees will be informed about possible physio-pathological mechanisms by which this can happen.
3. Attendees will have an overview of our work related injury database, and will understand the frequency of these types of injuries.

Background: Neurotological findings secondary to electrical injury are rarely reported in medical literature. This paper aims to characterize these findings after an electrical injury, in a series of 41 patients. To our knowledge, this will be the largest case series reported in the ENT literature. **Methods:** Retrospective analysis of 3438 patients in the principal authors' Workplace Safety & Insurance Board database (1986-2014). Statistical analysis was performed using SPSS®(IBM). **Results:** 41 patients were included of which 30 worked in construction (or related trades). All had multiple symptoms (39 presented with dizziness). 10 patients had a related head injury. There was no statistical difference in symptoms or test results between those with/without head injury. Based on their presentation the most common neurotologic findings were: Multiple, recurrent spontaneous dizziness (light-headedness) episodes, lasting seconds, associated with tinnitus and aural fullness. Laboratory testing could not differentiate side of lesion. Symptom resolution occurred in 7/39 patients (5/7 within 2 weeks of the injury). **Conclusions:** Characterization of electrical injuries and their neurotologic features are provided. Further research and histological studies are needed.

Importance of Stereoscopy in Haptic Simulation for Temporal Bone Surgical Training – J. Hochman, B. Tordon, B. Unger, J. Pisa, Winnipeg, MB

Learning Objectives

1. Obtain a better understanding of current ENT surgery training materials
2. Obtain a better understanding of the role played by stereoscopy
3. Obtain a better understanding of virtual haptic training for ENT surgery

Objectives: Haptic simulations of the temporal bone provide a safe, reproducible 3D environment for surgical training. Most simulators currently in use provide a stereoscopic view of the operative field. While some studies have demonstrated spatial learning benefits in other fields with stereovision, the value of stereoscopy in temporal bone surgery simulations is unknown. We investigate the effects of stereoscopic haptic simulation on surgical performance.

Methods: 20 first year medical students (11M/9F) took part in a haptic training session. All subjects viewed a 13 minute training video on cortical mastoidectomy. They then performed 3 mastoidectomies over 40 minutes using an in-house temporal bone simulation using a haptic device (Geomagic Touch - SC, USA), stereo shutter glasses (Nvidia 3D Vision, Nvidia, CA, USA, and a 3D plasma screen display (Panasonic TCP65VT30, Panasonic, Osaka, Japan). Subjects were randomized to either a stereo group (glasses active) or non-stereo group (glasses inactive) with 10 subjects per group. Following training, subjects performed a test mastoidectomy on a single 3D printed bone model. **Results:** Each test was independently graded by 2 reviewers using a 7 point, modified Welling's Scale. A two-tailed t-test showed no significant difference in overall performance (mean score across test categories over all subjects) between stereo (M=3.8, SD=1.1) and non-stereo (M=4.4, SD=1.5) conditions ($p = 0.163$). **Conclusions:** While underpowered, this study suggests that stereo vision in haptic temporal bone training makes no difference in surgical performance.

Import of Haptic Manipulandum and Device Fidelity on Expert User Perception in Virtual Temporal Bone Surgery – J. Hochman, V. Rampersad, N. Sepehri, B. Unger, J. Pisa, Winnipeg, MB

Learning Objectives

1. To become familiar with disparate haptic devices.
2. To become familiar with haptic force capabilities, degrees of freedom (DOF) and manipulandi.
3. Understanding of the relative effect of modified hardware on user perception of simulation efficacy.

Objectives: Contact forces from haptic software simulations rely on device fidelity (DOF & force capability) and are transmitted through an end effector. With identical software, device hardware and manipulandum may each contribute to differences in perceived realism. We compare the Geomagic Touch (Geomagic, SC) to the HD2 (Quanser, ON) with both standard manipulandum and customized otic drill end effector (Medtronic, MN) to determine surgeon preference. **Methods:** Six Otologic Surgeons performed 3 virtual mastoidectomies using in-house temporal bone simulation software. The HD2 manipulandi was modified for attached, gravity compensated, otic drill with modification of the driver mechanism. Surgeons, in random order, used 1) Geomagic Touch (standard manipulandum); 2) HD2 (standard manipulandum; and 3) HD2 (modified manipulandum). After each case, surgeons rated the simulation for perceived educational value using a 7-point scale. At the completion of the experiment, surgeons ranked the three simulation experiences. **Results:** Acoustic Properties and Overall Similarity of Bone were statistically different on ANOVA testing. Two-tailed t-tests demonstrate that the HD2 modified manipulandum was rated significantly higher than either the Geomagic ($p \leq 0.0004$) or the unmodified HD2 ($p \leq 0.0004$) for Acoustic properties. For Overall Similarity of Bone, both HD2 standard manipulandum ($p \leq 0.05$) and modified manipulandum ($p \leq 0.03$) were favored over the Geomagic system, however not when directly compared. When ranked, users selected the modified HD2 1st among modalities ($p \leq 0.0164$). **Conclusions:** While only Acoustic properties illustrated significance; in the rank-list assessment, surgeons preferred higher over lower fidelity haptic hardware especially when modified to include an active manipulandum.

A New Simple Radiological Scoring System Classifying the Tegmen of the Mastoid – A. Ho, K. Greeff, R. Murphy, Edmonton, AB

Learning Objectives

1. Understand the importance of bony tegmen injury during mastoid surgery.

2. Apply the measurement method used scoring the height of tegmen based off a CT temporal bone study.
3. Review the discrete populations that tegmen height in this study population falls into.

Objective: To create a scoring system that evaluates the height of the tegmen as it relates to the lateral semicircular canal **Design:** Radiographic study correlated with anatomical model **Setting:** Tertiary referral center for otology and neuro-otology **Patients and Methods:** Computerized tomography studies of temporal bone were collected from patients undergoing workup for hearing loss. Mastoid dimensions were measured out in the coronal, axial, and sagittal planes relating to the lateral semicircular canal. A perpendicular line from the lateral canal to the tegmen was then taken in coronal and sagittal views. Histograms and quantile-quantile (Q-Q) plots were generated for each measurement and compared to the normal distribution. The radiographic data was used to generate four classes of tegmen variability. This model was then applied to cadaveric temporal bones. MRIs of children undergoing workup for sensorineural hearing loss were then compared to this model to evaluate the difference in tegmen height in abnormal MRI studies. **Results:** 143 individual temporal bone CT scans were reviewed. Tegmen height dimensions relating to the lateral semicircular canal in the coronal and sagittal views are 4.76mm and 5.45mm respectively, with standard deviations of 2.82 and 2.71. Q-Q plot generation with decile analysis demonstrated four distinct modes of distribution of tegmen height which was maintained in cadaveric measurements but lacking in abnormal MRI studies. **Conclusions:** Simple scoring systems of tegmental height of the mastoid have not been previously described with regard to the lateral semicircular canal. Delineation of these four patterns of tegmen height allows the surgeon to be aware of the potential for dural injury when performing mastoid surgery, to plan the surgical approach and predict the likelihood of preserving the canal wall in mastoid surgery

HOW I DO IT

Early Postoperative Results of CO2 Laser Stapedotomy Using the Kurz Soft Clip Stapes Prosthesis – N. Arnstead, N. Shoman, Saskatoon, SK

Learning Objectives

1. Assess the early efficacy of a new Kurz Sof CliP stapes prosthesis with enhanced design features in otosclerosis surgery.
2. Assess the safety of the prosthesis with respect to incus clipping and risk of iatrogenic sensorineural hearing loss.
3. Discuss the unique design features and surgical technique specific to the prosthesis.

OBJECTIVE: To report on the short-term results of CO2-laser stapedotomy using the Kurz titanium Soft Clip stapes prosthesis, and assess the technical aspects of the surgery unique to this design. **STUDY DESIGN:** Retrospective case series. **SETTING:** A tertiary referral center. **PATIENTS:** Over a one year period, forty six consecutive patients with a history and audiologic criteria consistent with a diagnosis of otosclerosis who underwent primary stapedotomy, with available post-operative pure-tone audiometry. **INTERVENTION:** All patients underwent primary CO2 laser stapedotomy using 0.6 mm diameter Kurz Soft Clip prosthesis without an interposition graft. **OUTCOME MEASURES:** Preoperative and 3 month postoperative audiometric evaluation using conventional 4-frequency (0.5, 1, 2, and 4 kHz) audiometry. Air-conduction thresholds, bone-conduction thresholds, and air-bone gap (ABG) were measured. **RESULTS:** Overall, postoperative ABG closure to within 10 dB was achieved in 41 of 46 (89%) of cases. ABG closure was within 30 dB in three cases, and unchanged in two cases. Analysis for all cases showed mean gain in air-conduction threshold was 29 dB, and mean air-bone gap

closure was 12 dB. There was no postoperative perceptive hearing loss exceeding 15 dB on any measured frequency. **CONCLUSION:** Short term results of the Kurz Soft Clip titanium stapes prosthesis suggest that it is safe and effective, with a clip design to accommodate incus anatomical variations. Longer term audiometric data is required to assess proposed design features that minimize lenticular process necrosis.

HOW I DO IT

Office Based Underlay Tragal Cartilage Tympanoplasty Under Local Anesthetic – N. Shoman, Saskatoon, SK

Learning Objectives

1. Describe a modified surgical technique for office based underlay cartilage tympanoplasty for closure of any perforation size as long as the entire perforation margin is visualized.
2. Assess anatomic and functional success rates with early experience using this technique.
3. Assess safety with regards to early postoperative complications and patient tolerability.

Objective: In 1998, Eavey described the “butterfly” inlay technique for closure of small tympanic membrane perforations in pediatric patients. Later, Lubianca-Neto reported the use of this technique in adults under local anesthetic without any associated split-thickness skin graft. This study describes a further modification using an underlay cartilage graft and hyaluronic acid (EpiDisc) as a local anesthetic-based in-office procedure. **Materials and Methods:** This study included 67 patients (11 to 90 years) who underwent underlay tragal cartilage tympanoplasty under local anesthetic from June 2013 to August 2014, using single or palisading grafts. The procedure involved middle ear packing with Gelfoam and placement of an overlay EpiDisc membrane. Exclusion criteria included inability to completely visualize entire perforation margin regardless of size, and significant conductive hearing loss suggestive of ossicular involvement. Anatomic success was defined as an intact tympanic membrane at three months postoperatively. **Results:** Complete tympanic membrane closure was observed in 58 (86.6%). Of the 9 failures, 5 had microperforations that were conservatively managed with no water restrictions. The mean air-bone gap decrease was 8.6 dB. Average operative time was 36 minutes. The most common complication was immediate post-operative nausea in 7 patients (10.4%). **Conclusion:** Underlay tragal cartilage tympanoplasty is feasible and effective as an office procedure under local anesthetic, even in larger perforations using the palisading technique. Aside from being cost effective and associated with shorter operative times, patient benefits include avoiding general anesthetic, and faster recovery.