Older Adults
Key Abstracts by Topic
TOPICS

- Candidacy
- Benefits and Outcomes
- Quality of Life
- Cognition
- Depression
- Treatment Options
CANDIDACY


Abstract:

OBJECTIVES: We evaluated the quality of life following cochlear implantation in elderly postlingually deaf adults. METHODS: Data were studied concerning demographics and audiometric evaluation in postlingually deaf adults at least 60 years of age who underwent cochlear implantation in 3 institutions. The Glasgow Benefit Inventory was used to quantify the quality of life. The patients were divided into 2 groups (those less than 70 years of age and those at least 70 years of age), and the results were also compared to those of younger adult cochlear implant recipients (less than 60 years of age). RESULTS: Eighty-one patients were included in this study. The mean age at implantation was 68 years (range, 60 to 82 years). Cochlear implantation significantly improved the patients’ audiometric outcomes (pure tone average and speech perception; p < 0.05). The Glasgow Benefit Inventory showed a benefit overall (+36) and on the individual subscales (+49, +20, and +1). The difference in quality of life was not significant between those less than 70 and those at least 70 years of age (p = 0.90). The results were similar to those of younger postlingually deaf implant recipients. CONCLUSIONS: Elderly cochlear implant users experience an improvement in their quality of life, with outcomes similar to those achieved in younger adults. Particular attention must be paid to the possibility of age-related conditions in the elderly that may increase the risks of surgery.

Abstract:

PURPOSE: To assess the benefits of cochlear implantation in the elderly.

Patients and methods: A retrospective analysis of 31 postlingually deafened elderly (≥60 years of age) with unilateral cochlear implants was conducted. Audiological testing included preoperative and postoperative pure-tone audiometry and a monosyllabic word recognition test presented from recorded material in free field. Speech perception tests included Ling’s six sound test (sound detection, discrimination, and identification), syllable discrimination, and monosyllabic and multisyllabic word recognition (open set) without lip-reading. Everyday life benefits from cochlear implantation were also evaluated. RESULTS: The mean age at the time of cochlear implantation was 72.4 years old. The mean post-implantation follow-up time was 2.34 years. All patients significantly improved their audiological and speech understanding performances. The preoperative mean pure-tone average threshold for 500 Hz, 1,000 Hz, 2,000 Hz, and 4,000 Hz was 110.17 dB HL. Before cochlear implantation, all patients scored 0% on the monosyllabic word recognition test in free field at 70 dB SPL intensity level. The postoperative pure-tone average was 37.14 dB HL (the best mean threshold was 17.50 dB HL, the worst was 58.75 dB HL). After the surgery, mean monosyllabic word recognition reached 47.25%. Speech perception tests showed statistically significant improvement in speech recognition. CONCLUSION: The results of this study showed that cochlear implantation is indeed a successful treatment for improving speech recognition and offers a great help in everyday life to deafened elderly patients. Therefore, they can be good candidates for cochlear implantation and their age alone should not be a relevant or excluding factor when choosing candidates for cochlear implantation.

Abstract:

OBJECTIVE: An aging American population carries a high prevalence of profound sensorineural hearing loss. We examined the performance of multichannel cochlear implant recipients in a large database of adult subjects. DESIGN: Nonconcurrent prospective study of a national cohort with multivariate regression analysis of preoperative and postoperative performance variables in multichannel cochlear implant recipients. We applied models of prediction established in previous studies to the observed results. SETTING: Referral centers with active cochlear implant programs. PATIENTS: Adolescents and adults with profound hearing loss (N = 749; age range, 14-91 years). MAIN OUTCOME MEASURE: Postoperative monosyllabic word recognition. RESULTS: The population 65 years and older demonstrated a clinically insignificant 4.6%-smaller postoperative word score compared with the population younger than 65 years. When duration of deafness exceeded 25 years, elderly recipients demonstrated higher word scores than their younger counterparts. A more significant factor affecting outcomes is the ratio of duration of deafness to age at implantation. CONCLUSIONS: Age at implantation carried relatively little predictive value for postoperative performance in subjects 65 years and older. Although a small decrement in mean speech recognition scores was evident, the clinical significance of this difference is questionable when all of the results observed in elderly patients are considered. A shorter percentage of life spent in severe-to-profound sensorineural hearing loss suggests a foundation of acoustic/auditory processing in the elderly cohort that may mitigate potential physiological effects associated with advanced age. This study confirms and extends previous observations that duration of profound deafness and residual speech recognition carry higher predictive value than the age at which an individual receives an implant.

Abstract:

OBJECTIVES: The objectives of this study were to estimate the cost-effectiveness of unilateral cochlear implantation for postlingually deafened adults; to study the impact on cost-effectiveness of relaxing criteria of candidacy to include patients who benefit from acoustic hearing aids; and to study the further impact of age at implantation and duration of profound deafness before implantation. DESIGN: This prospective cohort study was carried out in 13 hospitals with four groups of severely to profoundly hearing-impaired subjects distinguished by their preoperative ability to identify words in prerecorded sentences when aided acoustically. The groups represent a progressive relaxation of criteria of candidacy: Group I (N=134) scored 0% correct without lipreading and did not improve their lipreading score significantly when aided; group II (N=93) scored 0% without lipreading but did improve their lipreading score significantly when aided; group III (N=53) scored 0% without lipreading when the ear to be given an implant was aided but between 1% and approximately 50% when the other ear was aided; and group IV (N=31) scored between 1% and approximately 50% without lipreading when the ear to be given an implant was aided. Lifetime costs to the UK National Health Service of providing and maintaining a cochlear implant were estimated for each subject. The gain in health utility from cochlear implantation was estimated with the Mark III Health Utilities Index and was combined with life expectancy to estimate the number of quality-adjusted life-years (QALYs) that would be gained from cochlear implantation. Cost/QALY ratios were calculated by means of the Net Benefit technique and were compared with an upper limit of acceptability of 50,000 euros/QALY. RESULTS: Averaged over the whole cohort, the cost of gaining a QALY was 27,142 euros (95% confidence interval, 24,532 euros to 30,323 euros); 203 of 311 (67%) of the cohort displayed cost/QALY ratios more favorable than 50,000 euros/QALY. The average cost of gaining a QALY increased from group I (24,032 euros) to groups II
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(27,062 euros) and IV (27,092 euros) to group III (39,009 euros). Cost/QALY varied with age at implantation from 19,223 euros for subjects who were younger than 30 yr of age to 45,411 euros for subjects who were older than 70 yr of age. Cost/QALY was unacceptable because of minimal gain in health utility for the subset of groups I and II, who were given implants in ears that had been profoundly deaf for more than 40 yr and for the subset of groups III and IV, who were given implants in ears that had been profoundly deaf for more than 30 yr. CONCLUSIONS: Cochlear implantation was a cost-effective intervention for the majority of subjects, including the group given implants when older than 70 yr of age. Relaxation of criteria of candidacy for cochlear implantation reduces cost-effectiveness. Prioritization of the provision of cochlear implantation should take duration of profound deafness in the ear to be given an implant into account, as well as preoperative word recognition performance.

**BENEFITS & OUTCOMES**


**Abstract:**

OBJECTIVE: The aim of this study is to assess the impact on quality of life, hearing performance, and surgical complications among patients aged 80 years and older, at the time of cochlear implantation. DESIGN: Retrospective chart review and quality of life assessment. SETTING: Tertiary referral center. PATIENTS: All elderly cochlear implant recipients aged 80 years and older (30 patients), who underwent implantation through the Quebec Cochlear Implant Program. INTERVENTION(S): Postoperative validated quality-of-life questionnaire with clinical and audiologic data extraction using the medical record. MAIN OUTCOME MEASURE(S): The validated "Glasgow Benefit Inventory" questionnaire was used to quantify the impact on quality of life. Audiologic preoperative and postoperative evaluation consisted of speech recognition scores (MAT and HINT
scores). Complications were retrospectively collected after each cochlear implantation.

RESULTS: A majority of them reported using their cochlear implant almost always with
great quality-of-life benefits (increase +37.5 on the GBI). They also experienced a
significant improvement in audiologic performance as seen with speech recognition
scores (p < 0.0001). There were very few surgical complications, but 4 patients had
delayed complications (otalgia, tinnitus, and hyperacusis). CONCLUSION: This is the
most extensive study on the impact of quality of life for patients aged 80 years and older
who received a cochlear implant. The audiologic benefit in this population is undeniable,
and the quality-of-life improvement is comparable to studies made on much younger
patients. It is also well-tolerated surgery with relatively low risk but with possible delayed
complications. Given all these results, there should be no concerns regarding
implantation in well-selected octogenarians.

Roberts DS, Lin HW, Herrmann BS, Lee DJ. Differential cochlear implant

Abstract:

OBJECTIVES/HYPOTHESIS: The goals of this study were to analyze whether cochlear
implant (CI) users over 65 years of age have different surgical and audiological
outcomes when compared to younger adult CI users and to identify reasons for these
possible differences. STUDY DESIGN: Retrospective single-institution study.
METHODS: Records of 113 postlingually deafened adults with unilateral cochlear
implants were reviewed. Preoperative and postoperative speech perception scores, and
medical and epidemiological data were recorded and analyzed.
RESULTS: Speech perception ability was significantly poorer in CI users over 65 years
of age compared to younger adult patients (P = .012). Patients over the age of 80 years
accounted for these findings (P = .017). Older patients were less likely to have a family
history of hearing deficits. A history of noise exposure and idiopathic cause of hearing
loss did not correlate with audiological outcomes. A family history of hearing loss was
associated with a trend toward better speech recognition (P = .062). Older patients did

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not experience more vestibular symptoms or other complications compared to younger patients. CONCLUSIONS: Patients over the age of 80 years had lower speech perception scores than other adult CI recipients but did not have higher rates of dizziness or vertigo after surgery. A family history of hearing loss was associated with a trend toward better speech recognition, possibly representing a new prognostic variable. These findings provide important information that will aid clinicians in counseling older CI candidates.


Abstract:

IMPORTANCE: A review of a test battery presented in both quiet and noise may clarify what the progression of speech perception abilities is in older adult cochlear implant users and whether the performance declines with advancing age. OBJECTIVE: To examine whether older adults (≥65 years) with cochlear implants maintain stable speech perception performance after at least 10 years of listening experience with an external speech processor. DESIGN AND SETTING: Retrospective analysis performed in an academic tertiary care center. PARTICIPANTS: Fourteen older adult cochlear implant recipients with at least 10 years of listening experience. MAIN OUTCOME MEASURES: Speech perception outcomes as measured with Consonant-Nucleus-Consonant words in quiet and Hearing in Noise Test sentences in quiet and steady-state noise were analyzed retrospectively at the 6-month and 1-, 5-, and 10-year postoperative follow-up intervals. RESULTS: Consonant-Nucleus-Consonant word scores remained stable between 6 months and 1 year of listening experience, improved significantly (P < .001) between 1 year and 5 years, and remained stable between 5 years and 10 years. Hearing in Noise Test sentence scores in quiet and noise showed a similar pattern, with stability in performance between the 6-month to 1-year and 5-year to 10-year follow-up intervals, and significantly improved performance (P = .04) between
the 1-year and 5-year follow-up intervals. CONCLUSIONS AND RELEVANCE: On average, patients who undergo cochlear implantation at age 65 years or older do not experience a decline in speech perception performance with extended listening experience and may potentially continue to see improvements beyond the 1-year follow-up interval.


Abstract:

OBJECTIVES: Quantifying the improvement in quality of life (QoL) of cochlear implant (CI) patients over 60, its relation to audiometric benefits and the subjective impact on specific areas of life. METHODS: An observational retrospective study was conducted on 26 individuals (17 male and 9 female) older than 60, all implanted in our unit between 1 January 1999 and 31 January 2009. And 10 patients (5 male and 5 female) aged between 40 and 60 were the control group. A full postoperative audiological evaluation was completed. Sociodemographic characteristics and history of hearing loss were collected. To evaluate QoL benefits, the Glasgow Benefit Inventory test and the Specific Questionnaire were filled in. RESULTS: Patients in the test and control groups had similar preoperative speech recognition levels. Preoperative audiometric thresholds were significantly worse in patients from 40 to 60 years of age although they scored better in speech recognition after implantation. Patients experienced significant improvement in their QoL in all areas, especially in general health, while they experienced a smaller improvement in social interaction. Age, duration of deafness, and years wearing the processor were statistically related to QoL regardless of audiometric benefit. Unilateral CI users and patients without tinnitus obtain better QoL although no statistical relation was found. CONCLUSIONS: Cochlear implantation improves QoL of patients over 60 by the mere fact of having been implanted, regardless of poorer audiological benefits. Older patients, with long-term deafness experience a greater

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improvement in QoL after implantation. The results of this study should aid other centers when counseling patients on the expected, daily functional benefits of cochlear implantation.


Abstract:

OBJECTIVES: A review of adults receiving cochlear implants (CIs) at the Yorkshire Cochlear Implant Service (YCIS) was performed to assess whether age affects use or outcomes. METHODS: A retrospective analysis of all patients over the age of 50 implanted and habilitated at the YCIS was undertaken. Outcome measures included quality of life (QoL) questionnaires and speech perception tests: CUNY sentences and BKB sentences. Comparisons were made between patients implanted age 50 to 59 (A), 60 to 69 (B) and 70 and over (C). Patients with English as a second language and those implanted for less than 9 months were excluded. Data was analysed using a repeated measure regression model. RESULTS: 80 adults were included; A, 31; B, 29; C, 20. Significant improvements were seen in speech perception scores in all groups from pre-implant to 3 months. No statistically significant difference was found between the 3 groups in any outcome measure. QoL scores overall showed increased independence and greater participation in social activities with all patients feeling their implant had been successful. DISCUSSION: Increased life expectancy and availability of cochlear implants (CIs) has led to greater numbers of older patients being eligible for implantation. Our results show improved speech perception and QoL outcomes in all groups. The lack of statistically significant differences between age groups supports the benefits of CIs in the older population. Older age should not be a discriminating factor in candidacy for cochlear implantation and referral of older patients to implant centres should be encouraged.

Abstract:

OBJECTIVES: To analyse complications and outcome of cochlear implant (CI) treatment in seniors receiving Cis during a 10-year period. METHODS: A total of 28 patients, 79 years or older (mean age 81.6 years), were evaluated and compared with a younger group of 76 patients, 20–60 years old (mean age 48.9 years). A retrospective study of the patients’ records was performed. Data on per- and post-operative complications, pre- and post-operative speech perception, estimated cognitive skills, and social situation was extracted. A subjective score was assessed and correlated with post-operative performance. RESULTS: No severe per- or post-operative surgical complications were noted. Speech perception improved significantly after surgery (P < 0.001). The younger age group showed better results post-operatively for monosyllabic words (P < 0.01) compared with the older group with no difference seen for bi-syllabic words. In both the groups, there were no significant differences between patients living with or without social support. DISCUSSION: CI surgery for patients 79 years or older was well tolerated. Patients benefited greatly from the device with improved hearing. CI should not be denied older individuals who are otherwise in good health. Non-use in the elderly was associated with post-operative vertigo and tinnitus, severe disease and limited social support.


Abstract:

OBJECTIVES/HYPOTHESIS: To evaluate the hearing performance with cochlear implants (CIs) in patients who were 70 years or older at the time of implantation (geriatric patients) and compare it with the performance in younger adults. STUDY
DESIGN: Individual, retrospective, cohort study. METHODS: A cohort of 1,005 postlingually deafened adults was selected for this study. According to their age at the time of cochlear implantation, patients were divided into four age groups: group 1, 18 to 39 years; group 2, 40 to 59 years; group 3, 60 to 69 years; and group 4, 70 years and older). The test battery was composed of four standard German speech tests: Freiburger Monosyllabic Test, Speech Tracking Test, and Hochmair-Schulz-Moser (HSM) Sentence Test in quiet and in 10 dB noise. RESULTS: Geriatric patients showed a similar learning curve as the younger adults in the first 2 years after implantation. The direct comparison of speech perception in the Freiburger Monosyllabic Test, Speech Tracking Test, and HSM Test in quiet revealed no differences between the average performance of the geriatric patients and younger adults. However, in the HSM Test in noise, the performance of the geriatric group was significantly lower than the younger adults. CONCLUSIONS: Geriatric CI patients have a similar learning curve to younger adults, and in speech tests in quiet they show a comparable performance. However, their performance is significantly lower in noisy surroundings. This may be due to the central presbycusis in patients older than 70 years and should be taken into account in postoperative fitting of these patients. Further prospective studies are required to evaluate the role of special rehabilitation methods and cognitive training to improve the speech perception in noise in geriatric CI patients.


Abstract:

OBJECTIVES: To determine whether significant differences in cochlear implant (CI) performance exist between older and younger CI recipients. DESIGN: Retrospective comparison of audiometric data. SETTING: University hospital center. PARTICIPANTS: Sixty participants who received CIs at age 70 and older and 48 younger adults implanted between age 18 and 69. MEASUREMENTS: Speech outcome scores
(Consonant-Nucleus-Consonant words and phonemes and City University of New York Sentence test in quiet and noise). RESULTS: Older participants show significant improvement in speech perception scores after implantation. Although on average they do not perform as well as younger adults, this difference correlates with duration of deafness rather than age. In contrast to younger adults, significant differences in CI performance are seen in older recipients depending on the side of implantation, with those implanted on the right performing better than those implanted on the left. CONCLUSION: Postlingually deafened older adults obtained significant speech perception benefits from CIs, although differences in speech outcomes were seen between younger recipients and those implanted after age 70. In older adults considering CIs, hearing benefits appear greater if they are implanted in the right ear.


Abstract:

According to data from the Brazilian Institute of Geography and Statistics, the elderly population grew 47.8% in the last decade in Brazil. A portion of this population has severe and/or profound hearing loss and do not benefit from conventional hearing aids. Thus, the use of cochlear implant is required. AIM: To analyze the benefits of cochlear implants in the elderly based on the comparison of primary auditory thresholds before and after the operation, discrimination of sentences in speech and in talking on the telephone. METHODOLOGY: Retrospective cohort study, analyzing medical records from patients aged over 60 years, users of cochlear implant for at least 1 year. RESULTS: Fourteen medical records were analyzed. Mean age of patients was 63.07 years. The mean pure tone thresholds between 500Hz, 1kHz, 2kHz and 4kHz before the implantation was 113dBHL. None of the patients, before operation, could discriminate sentences in open sets and only 3 scored 17% in closed sets sentence recognition. After one year of implantation, the mean sound field thresholds reached 34dBHL, and open set sentences recognition of 93.57%, while 71% of the patients had
become able to have a conversation on the telephone. CONCLUSION: The elderly users of cochlear implant showed important outcomes, with significant improvement in understanding in the open set and in using the telephone.


Abstract:

OBJECTIVE: To characterize speech perception performance in elderly cochlear implant users compared with younger adult users. DESIGN: Case-control retrospective analysis from January 1, 1999, to January 28, 2008. SETTING: Tertiary care, academic practice cochlear implant program. PATIENTS: Medical records for 78 patients with age at implantation of 65 years or older were analyzed for ear-specific preimplantation speech perception performance, length of deafness, age at implantation, and 1-year postimplantation speech perception performance. A subset of 28 elderly patients with complete data was matched to 28 younger adult patients (age at implantation, 18-64 years) for preimplantation performance using the Hearing in Noise Test-Quiet scores (mean, 22% and 23%, respectively). MAIN OUTCOME MEASURE: One-year postimplantation performance on word and sentence testing. RESULTS: Within the elderly cohort, the Consonant-Nucleus-Consonant and Hearing in Noise Test-Quiet scores were not affected by age. The Hearing in Noise Test-Noise scores trended downward with increasing age but did not reach statistical significance (P = .052). Of the matched older and younger patients, 55 of 56 showed improvement in their 1-year postimplantation compared with preimplantation Hearing in Noise Test-Quiet scores, with better preimplantation performance predictive of better postimplantation performance, independent of age at implantation (P = .02). Group comparisons, however, revealed poorer postimplantation scores overall for the elderly patients compared with the younger ones for the Hearing in Noise Test-Quiet (70% vs 83%; P = .02) and the Consonant-Nucleus-Consonant test (38% vs 53%; P = .02).
CONCLUSIONS: Elderly patients benefit significantly from cochlear implantation. Compared with a younger cohort matched for preimplantation performance, however, their postimplantation scores are significantly lower on some measures. These results may provide guidelines for candidacy and counseling regarding elderly patients with cochlear implants.


Abstract:

OBJECTIVE: Previous studies have shown that cochlear implant outcomes with respect to surgical morbidity and speech perception may be poorer in elderly patients as compared with younger adults. However, recent anecdotal reports suggest that elderly cochlear implant recipients are achieving increasingly higher speech perception performance and fewer surgical complications than previously noted. Our objective is to review cochlear implant outcomes using newer generation implants and minimally traumatic cochleostomy techniques in patients 80 years and older compared with younger adult recipients. STUDY DESIGN: Retrospective chart review. SETTING: Tertiary referral center. PATIENTS: All adult cochlear implant recipients (232 patients, 258 implants) who underwent implantation with a Nucleus Freedom, Advanced Bionics HR90k, or Med El Sonata device at a tertiary academic institution. INTERVENTION(S): Postoperative speech perception scores and clinical data extraction using the electronic medical record. MAIN OUTCOME MEASURE(S): Anesthetic and surgical complications, device malfunction, operative time, admission status, length of hospital stay, and postoperative speech perception scores were collected after 50 cochlear implant procedures in patients who were implanted beyond the eighth decade and 208 among younger adults (18-79 yr). RESULTS: Patients 80 years or older were more likely to have anesthetic complications and require hospital admission (p < 0.05). There was no statistical difference between groups with respect to surgical complications or
device malfunction. Speech perception analysis revealed similar outcomes for older and younger patients. CONCLUSION: Cochlear implantation is well tolerated across all adult age groups with a relatively low risk for adverse surgical events or device malfunction. Given the favorable safety profile and high levels of speech perception achieved by older patients, routine implantation of octogenarian and nonagenarians seems warranted. These results also stress the need for thorough preoperative evaluation of elderly patients, given the increased likelihood for perioperative anesthetic complications.


Abstract:

OBJECTIVE: Previous studies have demonstrated consistent benefit in older adults undergoing cochlear implantation as compared with younger control groups, with age category thresholds between 60 and 70 years. The objective of this study is to report auditory performance in implant recipients older than 75 years, a cohort for which few data have been reported. STUDY DESIGN: Retrospective chart review. SETTING: Academic cochlear implant program in a tertiary-care hospital. PATIENTS: Twenty-eight cochlear implant recipients were subdivided into implant users older than 80 years (Group 1) and recipients currently older than 75 years (Group 2). INTERVENTION: Cochlear implantation. MAIN OUTCOME MEASURES: Open-set speech perception scores. METHODS: Postoperative open-set speech perception scores were compared with preoperative scores in the best-aided condition. Criteria were developed to define situations where the implant was considered to be nonbeneficial or less beneficial than amplification, and those data were then subjected to Kaplan-Meier analysis. RESULTS: Group 1 included 13 patients with mean age of 80.7 years at the time of implantation. Group 2 included 15 patients with a mean age of 71.6 years. Scores were significantly better postoperatively at 6 months (p < 0.01) for Group 2 and at 12 months (p < 0.01)
CONCLUSION: Cochlear implantation in patients older than 75 years is beneficial, and Kaplan-Meier analysis demonstrates that the clinical benefit is durable over time. Patients older than 80 years obtain similar benefit, although auditory performance was less robust.


Abstract:

OBJECTIVE: Compare results of cochlear implantation in younger and older adults in the domains of disability and handicap, as well as in tests of word recognition and localization, across unilateral implant (CI), bilateral (CI + CI), and CI with an acoustic hearing aid in the nonimplanted ear (CI + HA). DESIGN: Three parts: retrospective (postimplant only) analysis; prospective (preimplant versus postimplant); correlation between age and benefit from CI versus CI + CI. Two age groups, older and younger than 60 years, for the first 2 analyses; age is a continuous variable for the third analysis. SETTING: Tertiary referral hospital clinic. PATIENTS: Postlingually severely-to-profoundly hearing-impaired adults: Totals of 68 CI, 36 CI + CI, and 38 CI + HA in the retrospective part of the study; totals of 30 CI, 18 CI + CI, and 16 CI + HA in the prospective parts. Numbers vary from these totals on individual measures. INTERVENTIONS: Patients receive either 1 or 2 cochlear implants; some with 1 CI opt to retain a hearing aid in the nonimplanted ear. OUTCOME MEASURES: Principal measures: Hearing Handicap Inventory for the Elderly, Hearing Handicap Questionnaire, Speech, Spatial and Qualities of Hearing Scale, word recognition test, and soundfield localization test. The study is exploratory, but proceeding from a null hypothesis of no expected contrast as a function of patient age. RESULTS: All patient groups show significant benefit after implantation. No significant age-related differences are observed in patients with unilateral implant, nor in CI + HA group. In the CI + CI
group, the younger cohort showed very substantial increases in both performance and self-rated abilities; the older cohort provides more mixed outcomes. CONCLUSION: Results for the CI group confirm and extend earlier research. The result for the younger group of CI + CI patients demonstrates the consistent incremental benefit obtained from a bilateral procedure. The mixed outcome observed in the older CI + CI group might be due to individual differences in interaction between effects of aging and the ability to integrate binaural cues.

**Noble W, Tyler R, Dunn C, Bhullar N. Hearing handicap ratings among different profiles of adult cochlear implant users. Ear Hear 2008 Jan;29(1):112-20**

**Abstract:**

OBJECTIVE: The aim was to compare outcomes in the domain of self-reported hearing handicap across groups of patients fit with one versus two cochlear implants (CI, CI + CI), or with an implant and a hearing aid (HA) in the nonimplanted ear (CI + HA).

DESIGN: The design was retrospective, and a preliminary step was to factor analyze the two measures used, namely, the Hearing Handicap Inventory for the Elderly (HHIE) and the Hearing Handicap Questionnaire (HHQ). Longer versus shorter-term experience with a single implant profile was compared, and further analysis confined to patients fit for less than 100 mo across the three profiles. Pre- versus postimplant self-report and performance (speech test, localization) data were also compared. RESULTS: Three factors were identified in the HHIE, labeled Emotional Distress (HHIE), Difficulty in Hearing, and Social Restriction (HHIE). Highest handicap score for Emotional Distress (HHIE) was observed in the CI + HA group. There were significantly lower scores for Difficulty in Hearing in the CI + CI group than in the CI (p = 0.02) or CI + HA (p = 0.001) groups. On the Social Restriction (HHIE) subscale, the CI + CI group reported significantly lower rating than the CI (p = 0.009) or CI + HA (p = 0.006) groups. Two factors were identified in the HHQ, labeled Emotional Distress (HHQ) and Social Restriction (HHQ). Significantly higher Emotional Distress (HHQ) score was observed in the CI + HA group than in the CI + CI group (p = 0.002); significantly lower Social...
Restriction (HHQ) score was found in the CI + CI group than in the CI (p = 0.02) or CI + HA (p < 0.001) groups. Pre-post speech test performance showed least contrast in the CI + HA group. CONCLUSIONS: Outcomes demonstrate an evident reduction from single or bilateral implantation in the area of emotional distress and a further advantage from bilateral implantation in the areas of hearing difficulty and social restriction.


**Abstract:**

CONCLUSIONS: Elderly patients benefit from cochlear implantation in terms of speech perception and quality of life. Age alone should be no contraindication for implantation. OBJECTIVE: There have been concerns whether elderly patients may perform poorly after cochlear implantation due to degenerative processes in the central and peripheral auditory systems. The purpose of this study was to analyze the benefits of cochlear implantation in elderly patients in comparison to younger recipients. MATERIAL AND METHODS: We examined 26 postlingually deafened adults aged > 65 years who received a cochlear implant at our center regarding preoperative findings, comorbidities, postoperative complications and quality of life. Speech perception was assessed by means of multi- and monosyllabic word recognition and compared to the results obtained by younger patients. RESULTS: The surgical procedure was well tolerated by all patients without notable perioperative complications. In terms of speech perception, no significant differences between the elderly patients and younger recipients were noted. All patients found that cochlear implantation had a positive impact on their quality of life.

Abstract:

OBJECTIVE: To evaluate the benefit of cochlear implantation in older adults aged 60 Years and over. METHODS: Fifty-six profoundly or totally hearing-impaired patients, aged 60 Years and over, were studied retrospectively. At the end of the preoperative evaluation, 28 patients received a cochlear implant. The mean age was 66 Years and the median follow-up was 22.5 Months. Speech perception scores before and after implantation were analyzed in order to evaluate the benefit of cochlear implantation. The speech perception score before implantation was compared to that of the non-implanted patients. RESULTS: There was a significant improvement of the dissyllabic words and sentences scores after implantation. The patients who are over 70 Years performed as well as those who are younger (between 60 and 70 Years). One patient developed a postoperative vertigo due a perilymphatic fistula. There was no flap-related problems. In the non-implanted group (mean age: 68 Years), 18 patients declined the cochlear device because they thought the subjective benefit of their hearing aid was sufficient and 5 patients declined because of surgical risk. The mean age, the cause and the duration of the deafness, and the speech perception scores were similar between implanted and non-implanted patients. CONCLUSION: This study demonstrates the beneficial effect of cochlear implantation in the elderly. These results suggest that a similar benefit could have been obtained in the patients who declined surgery. An early implantation could reduce the duration of the deafness and preserve binaural sound perception allowing increased performance in older people.
QUALITY OF LIFE


Abstract:

The purpose of this study was to evaluate the benefits of unilateral cochlear implant (CI) in patients over 60 on speech perception and quality of life, comparing the results obtained with a control group of younger CI recipients. Twenty CI users (mean age 72 years), postlingually deafened, were included in this study. Audiological performance was evaluated using bisyllabic words and sentences recognition tests in a quiet and a noise environment. Moreover, we administered two questionnaires to evaluate the health status (SF-36), CI-related effects on daily activities and personal satisfaction (Questionnaire for self-evaluation of CI benefit with SADL scale modification). Performance measures of the geriatric population showed a significant benefit on speech recognition tests compared to pre-implantation condition, even if younger CI users scored significantly better in both bisyllabic words and sentences recognition test. All study patients reported being able to have a normal conversation with an acquaintance. No significant difference was found between the study and control group in physical and mental health status, conversation with an outsider, use of TV and phone. A significant difference (p < 0.05) was noticed, instead, between elderly and younger adult patients about the overall satisfaction derived from CI. Our findings confirm the indisputable utility of CI and provide evidence that elderly patients derive a substantial benefit from it on quality of life, as demonstrated by health status, success in the common activities of daily living and perceived satisfaction after this procedure.

Abstract:

OBJECTIVES: To objectively evaluate the clinical and functional outcomes of cochlear implantation in an elderly population. DESIGN: Retrospective comparative study. SETTING: Neurotology unit at Manchester Royal Infirmary, a supraregional tertiary referral centre in collaboration with Adult Cochlear Implant Programme at The University of Manchester. PARTICIPANTS: All cochlear implant procedures (38) undertaken on post-lingually deafened elderly patients (age range at the time of implantation 65-80 years, n = 34) in the period from 1989 to 2002. Main outcome measures: Medical and surgical outcomes. Audiological performance outcomes for isolated words, words in sentences in quiet and noise. Functional outcome measures used are self-reported measures of the social, psychological and emotional aspects of quality of life, and the differences between expectations for functional outcomes and the realization of functional outcomes. They included expectation profiles, Glasgow Benefit inventory (GBI) and Glasgow Health Status Inventory Questionnaire (GHSI). RESULTS: There was statistically significant improvement post-implantation of both open and closed set test scores (P < 0.01). Eighty-two percentage of patients were completely satisfied with their cochlear implants. Patients judged that implantation restored half the loss of quality of life that they had experienced as a result of severe-profound deafness with a highly significant (P < 0.001) improvement in overall quality of life after implantation. The commonest post-operative observation was transient mild pyrexia. CONCLUSIONS: The age of a cochlear implant candidate should not be a factor in the candidacy decision-making process. The quality of life of our elderly recipients was significantly improved after cochlear implant.
Abstract:

OBJECTIVE: To compare the audiologic results of geriatric patients receiving cochlear implants with younger age groups and to evaluate the quality of life after cochlear implantation in the geriatric population by means of validated quality-of-life questionnaires. STUDY DESIGN: Cross-sectional study involving 89 postlingually deafened cochlear implant subjects. SETTING: Tertiary referral center. PATIENTS: A total of 89 postlingually deafened patients were included in the study, among which were 25 patients who were aged 70 years or older. INTERVENTIONS: All patients received a cochlear implant. Subjects were implanted with either the Laura, Nucleus 24, or Med-el Combi 40+ cochlear implant systems implementing the SPEAK, ACE, CIS, or CIS+ coding strategies. MEAN OUTCOME MEASURES: Speech recognition was determined by means of phonetically balanced monosyllabic word lists. The Hearing Handicap Inventory for Adults, the Glasgow Benefit Inventory, and the scale for the prediction of hearing disability in sensorineural hearing loss were used to quantify the quality of life. RESULTS: Mean audiologic performance for the three groups increased significantly after implantation (p <0.001). Postoperative audiologic performance of the geriatric population led to useful hearing, but these scores were significantly lower than for the younger age groups (p = 0.002). However, the quality-of-life outcomes for the geriatric group were similar to those of the younger age groups (p = 0.411 for the Hearing Handicap Inventory for Adults; p = 0.886 for the Glasgow Benefit Inventory). CONCLUSION: The results of this study prove that cochlear implantation in the elderly provides improvements in quality of life and speech understanding, similar to those for younger adult cochlear implant recipients.

Abstract:

OBJECTIVES: To analyze the postoperative complications associated with cochlear implant (CI) surgery in a large consecutive case series of older adults (≥60 yr).

STUDY DESIGN: Retrospective case review. Setting: Tertiary referral center.

Patients: Approximately 445 individuals aged 60 years and older who received a first CI between 1999 and 2011.

INTERVENTIONS: Cochlear implantation.

MAIN OUTCOME MEASURE(S): Postoperative complications classified as major (meningitis, immediate postoperative facial weakness, device failure, flap dehiscence, and surgical removal) and minor (surgical site infection, balance problems, delayed postoperative facial weakness, and facial nerve stimulation).

RESULTS: The mean age at implantation was 72.7 years (60-94.9 yr), and the median duration of follow-up was 4.8 years (0.1-12.5 yr). There were 42 minor complications in 41 patients (9.2%) and 36 major complications in 21 patients (4.7%). Seventeen patients (3.8%) required surgical device removal, 15 of whom underwent reimplantation. A Kaplan-Meier analysis of rates of device explantation demonstrated that at 5 and 10 years after CI, respectively, 95.4% and 93.1% of patients retained their original CI. When comparing complications between patients aged 60 to 74 years and those aged 75 years and older, there was a higher prevalence of balance problems lasting more than 1 month in the older group (9.5% versus 4.9%, p = 0.05).

CONCLUSION: Our results indicate that the safety profile of cochlear implantation in an older population is comparable to that of younger adults and children. We suggest that concerns for increased postoperative complications in patients of advanced age do not need to be a primary consideration when determining CI candidacy.

Abstract:

OBJECTIVES: To review a patient series of 16 cochlear implantations performed under local anaesthetic (LA), including a description of the centre's technique for this procedure. We also describe the application of a method for calculation of the potential morbidity/mortality avoided by using this technique. METHODS: Chart review of 16 patients' pre-operative medical and anaesthetic notes and calculation of predicted individual P-POSSUM Scores for operative morbidity/mortality. RESULTS: All 16 patients were implanted successfully with no significant complications. Age range was 26-92 years, with an average of 68 years. The patients' average predicted mortality score associated with a general anaesthetic (GA) was 8.6% and morbidity score was 58%. CONCLUSIONS: Our experience shows LA cochlear implantation to be a safe and effective procedure. It has the benefit of avoiding the operative mortality risk predicted by P-POSSUM Scores. Cochlear implantation is known to significantly improve quality of life for users. Our findings suggest a potential group of cochlear implant recipients considered 'unfit' for GA may be being denied access to this intervention or being exposed to additional risk.

Coelho DH, Yeh J, Kim JT, Lalwani AK. Cochlear implantation is associated with minimal anesthetic risk in the elderly. Laryngoscope. 2009 Feb;119(2):355-8

Abstract:

OBJECTIVES/HYPOTHESIS: Most elderly patients with severe to profound hearing loss are not being referred for cochlear implantation (CI), the only intervention to significantly improve hearing and quality of life in this population. Possible concern over the risks of anesthetic in the elderly may be one of the foremost concerns. The authors investigated whether advanced age is a risk factor when undergoing general anesthesia.
for cochlear implantation. STUDY DESIGN: Retrospective chart review. METHODS: A retrospective chart review was conducted at a tertiary academic referral center of 70 patients older than 70 years, who underwent CI with general anesthesia between 1984 and 2007, and for whom anesthesia records were available. Patients were divided into anesthetic risk group A (American Society of Anesthesiologist classification [ASA] I/II) and B (ASA III/IV). Intraoperative and postoperative anesthesia-related complications were identified. RESULTS: Of the 70 patients, 44 were in group A and 26 were in group B, both with a mean age of 77. Four patients, one from group A and three from group B, required intraoperative pressors for blood pressure support. There were no anesthesia-related complications in group A, but there were three (12% of group B and 4% overall) in group B: delayed extubation, postoperative congestive heart failure, and urinary retention. There was no long-term morbidity or mortality. CONCLUSIONS: General anesthesia is well tolerated by elderly patients undergoing cochlear implantation. Preexisting medical condition of the patient as defined by ASA is a better predictor of intraoperative and postoperative complication than age alone.

COGNITION


Abstract:

OBJECTIVE: To determine whether baseline hearing loss increases cognitive decline and risk for all-cause dementia in a population of elderly individuals. STUDY DESIGN: Longitudinal cohort study. SETTING: Community-based, outpatient. PATIENTS: Men and women aged 65 years or older without dementia at baseline. INTERVENTION(S): All subjects completed the Modified Mini-Mental Status Exam (3MS-R) at baseline and
over 3 triennial follow-up visits. Hearing loss (HL) at baseline was based on observation of hearing difficulties during testing or interview. Incident dementia was determined by clinical assessment and expert consensus. MAIN OUTCOME MEASURE(S): Dementia and 3MS-R score. RESULTS: At baseline, 4,463 subjects were without dementia, 836 of whom had HL. Of those with HL, 16.3% developed dementia, compared with 12.1% of those without HL (p < 0.001). Mean time to dementia was 10.3 years in the HL group versus 11.9 years for non-HL (log rank test p < 0.001). In Cox regression analyses controlling for sex, presence of APOE- [Latin Small Letter Open E]4 allele, education, and baseline age, and cardiovascular risk factors, HL was an independent predictor of developing dementia (hazard ratio = 1.27, p = 0.026 [95% CI, 1.03-1.56]). Linear mixed models controlling for similar covariates showed HL was associated with faster decline on the 3MS-R, at a rate of 0.26 points/year worse than those without HL.

CONCLUSION: Elderly individuals with HL have an increased rate of developing dementia and more rapid decline on 3MS-R scores than their nonhearing impaired counterparts. These findings suggest that hearing impairment may be a marker for cognitive dysfunction in adults age 65 years and older.


Abstract:

Hearing impairment in older adults is independently associated in longitudinal studies with accelerated cognitive decline and incident dementia, and in cross-sectional studies, with reduced volumes in the auditory cortex. Whether peripheral hearing impairment is associated with accelerated rates of brain atrophy is unclear. We analyzed brain volume measurements from magnetic resonance brain scans of individuals with normal hearing versus hearing impairment (speech-frequency pure tone average>25 dB) followed in the neuroimaging substudy of the Baltimore Longitudinal Study of Aging for a mean of 6.4 years after the baseline scan (n=126, age 56-86 years). Brain volume measurements were performed with semi-automated region-of-interest (ROI) algorithms, and brain

as of July 2014
volume trajectories were analyzed with mixed-effect regression models adjusted for demographic and cardiovascular factors. We found that individuals with hearing impairment (n=51) compared to those with normal hearing (n=75) had accelerated volume declines in whole brain and regional volumes in the right temporal lobe (superior, middle, and inferior temporal gyri, parahippocampus, p<.05). These results were robust to adjustment for multiple confounders and were consistent with voxel-based analyses, which also implicated right greater than left temporal regions. These findings demonstrate that peripheral hearing impairment is independently associated with accelerated brain atrophy in whole brain and regional volumes concentrated in the right temporal lobe. Further studies investigating the mechanistic basis of the observed associations are needed.


Abstract:

BACKGROUND Whether hearing loss is independently associated with accelerated cognitive decline in older adults is unknown. METHODS We studied 1984 older adults (mean age, 77.4 years) enrolled in the Health ABC Study, a prospective observational study begun in 1997-1998. Our baseline cohort consisted of participants without prevalent cognitive impairment (Modified Mini-Mental State Examination [3MS] score, ≥80) who underwent audiometric testing in year 5. Participants were followed up for 6 years. Hearing was defined at baseline using a pure-tone average of thresholds at 0.5 to 4 kHz in the better-hearing ear. Cognitive testing was performed in years 5, 8, 10, and 11 and consisted of the 3MS (measuring global function) and the Digit Symbol Substitution test (measuring executive function). Incident cognitive impairment was defined as a 3MS score of less than 80 or a decline in 3MS score of more than 5 points from baseline. Mixed-effects regression and Cox proportional hazards regression models were adjusted for demographic and cardiovascular risk factors. RESULTS In
total, 1162 individuals with baseline hearing loss (pure-tone average >25 dB) had annual rates of decline in 3MS and Digit Symbol Substitution test scores that were 41% and 32% greater, respectively, than those among individuals with normal hearing. On the 3MS, the annual score changes were -0.65 (95% CI, -0.73 to -0.56) vs -0.46 (95% CI, -0.55 to -0.36) points per year (P = .004). On the Digit Symbol Substitution test, the annual score changes were -0.83 (95% CI, -0.94 to -0.73) vs -0.63 (95% CI, -0.75 to -0.51) points per year (P = .02). Compared to those with normal hearing, individuals with hearing loss at baseline had a 24% (hazard ratio, 1.24; 95% CI, 1.05-1.48) increased risk for incident cognitive impairment. Rates of cognitive decline and the risk for incident cognitive impairment were linearly associated with the severity of an individual's baseline hearing loss. CONCLUSIONS Hearing loss is independently associated with accelerated cognitive decline and incident cognitive impairment in community-dwelling older adults. Further studies are needed to investigate what the mechanistic basis of this association is and whether hearing rehabilitative interventions could affect cognitive decline.

DEPRESSION


Abstract:

IMPORTANCE Depression among hearing impaired US adults has not been studied previously. OBJECTIVE To estimate the prevalence of and risk factors for depression among adults with hearing loss. DESIGN, SETTING, AND PARTICIPANTS Adults aged 18 years or older (N = 18 318) who participated in the National Health and Nutrition Examination Survey (NHANES), 2005-2010, a nationally representative sample. INTERVENTIONS Multistage probability sampling of US population. MAIN OUTCOMES AND MEASURES Depression, assessed by the 9-item Patient Health Questionnaire (PHQ-9) scale, and hearing impairment (HI), assessed by self-report and audiometric
examination for adults aged 70 years or older. RESULTS The prevalence of moderate to severe depression (PHQ-9 score, ≥10) was 4.9% for individuals reporting excellent hearing, 7.1% for those with good hearing, and 11.4% for participants who reported a little trouble or greater HI. Using excellent hearing as the reference, after adjusting for all covariates, multivariate odds ratios (ORs) for depression were 1.4 (95% CI, 1.1-1.8) for good hearing, 1.7 (1.3-2.2) for a little trouble, 2.4 (1.7-3.2) for moderate trouble, 1.5 (0.9-2.6) for a lot of trouble, and 0.6 (0.1-2.6) for deaf. Moderate HI (defined by better ear pure-tone average of hearing thresholds at 0.5, 1, 2, and 4 kHz within the range 35- to 49-dB hearing level) was significantly associated with depression among older women (OR, 3.9; 95% CI, 1.3-11.3), after adjusting for age, sex, race/ethnicity, lifestyle characteristics, and selected health conditions. CONCLUSIONS AND RELEVANCE After accounting for health conditions and other factors, including trouble seeing, self-reported HI and audiometrically determined HI were significantly associated with depression, particularly in women. Health care professionals should be aware of an increased risk for depression among adults with hearing loss.

**TREATMENT OPTIONS**


**Abstract:**

OBJECTIVE: To evaluate the outcomes of younger (<60 yr) and older (≥60 yr) patients implanted with the Vibrant Soundbridge (VSB). The aim was to determine if there were differences between groups. METHOD: A retrospective study was used to evaluate all patients who were implanted and fit with a VSB during 2008 and 2009 at the Department of Otorhinolaryngology-Head and Neck Surgery, Medical University Innsbruck. Differences in audiologic, medical, and surgical outcomes between younger and older patients were evaluated. RESULTS: No patients had major complications
during or after the surgical procedure. All patients had a good hearing benefit as supported by improvements in hearing thresholds from the preoperative to the postoperative condition in the sound field. There were differences between groups in speech understanding postoperatively; however, the differences were not statistically significant. CONCLUSION: All patients had, independent of age, good audiologic benefit from VSB use. Based on the low risk of medical or surgical complications, the easy use of the hearing implant, audiologic improvements, and potential social benefits, we think that the VSB should be regularly offered to adults with hearing loss, whether they are young or old.


Abstract:

BACKGROUND: According to the World Health Organization (WHO), by 2025 there will be approximately 1.2 billion people in the world over the age of 60, which marks a shift in world population to a greater proportion of older people. An estimated 70-80% of adults between 65 and 75 years of age suffer from presbycusis, or age-related, bilateral sensorineural hearing loss (HL) in the high frequencies. Presbycusis is correlated with decreased quality of life (QoL) and depression and according to WHO, is a leading cause of years lived with disability in the adult years. OBJECTIVE: The purpose of the current study was to review the body of literature on treatment options and considerations for the elderly population, as there is a variety of audio-technology available today to treat presbycusis. METHODS: A PubMed literature search was conducted using the keywords 'presbycusis/presbyacusis/geriatric AND hearing aids cochlear implants/electric acoustic stimulation/middle ear implants' and 'elderly AND cochlear implants'. References were also mined from papers found. RESULTS: 431 articles were considered in this review of treatment options for elderly patients suffering from presbycusis. CONCLUSION: Hearing aids and cochlear implants (CIs) are the
most commonly used devices for treating mild-severe presbycusis. Reported outcomes
with hearing aids indicate they are an effective method for treating mild-moderate HL in
cases where the patient is appropriately fitted and is willing, motivated, and able to use
the device. Depending on the type and severity of the HL and the specific needs of the
patient, electric-acoustic stimulation and active middle ear implants may also be
appropriate solutions for treating presbycusis. Finally, very positive QoL and speech
perception outcomes have been documented in treating severe-profound presbycusis
with CIs. In some studies, QoL outcomes have even exceeded expectations of elderly
patients.