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Review

Microvascular decompression for elderly patients with trigeminal neuralgia

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ABSTRACT

Microvascular decompression (MVD) has been demonstrated to be an excellent surgical treatment approach in younger patients with trigeminal neuralgia (TN). However, it is not clear whether there are additional morbidity and mortality risks for MVD in the elderly population. We performed a systematic literature review using six electronic databases for studies that compared outcomes for MVD for TN in elderly (cut-off ⩾60, 65, 70 years) *versus* younger populations. Outcomes examined included success rate, deaths, strokes, thromboembolism, meningitis, cranial nerve deficits and cerebrospinal fluid leaks. There were 1524 patients in the elderly cohort and 3488 patients in the younger cohort. There was no significant difference in success rates in elderly *versus* younger patients (87.5% *versus* 84.8%; P = 0.47). However, recurrence rates were lower in the elderly (11.9% *versus* 15.6%; P = 0.03). The number of deaths in the elderly cohort was higher (0.9% *versus* 0.1%; P = 0.003). Rates of stroke (2.5% *versus* 1%) and thromboembolism (1.1% *versus* 0%) were also higher for elderly TN patients. No differences were found for rates of meningitis, cranial nerve deficits or cerebrospinal fluid leak. MVD remains an effective and reasonable strategy in the elderly population. There is evidence to suggest that rates of complications such as death, stroke, and thromboembolism may be significantly higher in the elderly population. The presented results may be useful in the decision-making process for MVD in elderly patients with TN.

1. Introduction

Trigeminal neuralgia (TN) is a debilitating disorder that manifests in paroxysms of intense, lancinating pain along the divisions of the trigeminal nerve. Its incidence is estimated to be 4–5 per 100,000 and is increasing, particularly in the elderly population [1]. One of the underlying causes of TN is believed to be neurovascular compression at the root entry zone of the trigeminal nerve in the cerebellopontine cistern. As such, microvascular decompression (MVD) has been demonstrated to be an excellent surgical treatment approach in patients with TN, particularly younger patients, with good long-term outcomes and recurrence-free rates supporting the hypothesis that vascular compression is a major causative or contributing factor in the majority of patients [2].

However, it is not clear whether surgery is indicated in the elderly population, which is often assumed to have a higher risk of surgical complications, morbidity and mortality. The evidence comparing MVD outcomes in elderly *versus* younger populations is limited mostly to small, underpowered retrospective studies that suggested no significant differences in mortality and morbidity [3–9]. However, in a large national database, older age was significantly associated with death and strokes [10]. We hypothesise that MVD for TN in elderly patients may be associated with increased risk of morbidity and mortality. Given the conflicting results in the available literature, a systematic review and meta-analysis was conducted to assess differences in outcomes of elderly *versus* younger patients undergoing MVD for TN.

2. Methods

2.1. Literature search strategy

The present systematic review and meta-analysis was performed according to guidelines and recommendations of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [11,12]. Electronic searches were performed using Ovid Medline, PubMed, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, American College of Physicians Journal Club and Database of Abstracts of Review of

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Effectiveness from their dates of inception to July 2015. To achieve maximum sensitivity of the search strategy and identify all studies, we combined the terms "microvascular decompression", "trigeminal neuralgia", "elderly", "older", "age", "comorbidities", "anaesthetic risk", and "posterior fossa surgery" as either keywords or medical subheading terms. The reference lists of all retrieved articles were reviewed for further identification of potentially relevant studies. All identified articles were systematically assessed using the inclusion and exclusion criteria.

2.2. Selection criteria

Eligible comparative studies investigating MVD for TN in elderly *versus* younger populations were included in the present systematic review and meta-analysis. Cut-off age groups for the elderly included 60, 65 and 70 years. Case reports and case series with fewer than 10 patients were excluded. Studies that did not include efficacy, mortality or complication data were excluded. When institutions published duplicate studies with accumulating numbers of patients or increased lengths of follow-up, only the most complete reports were included for quantitative assessment at each time interval. All publications were limited to those involving human subjects and in the English language. Abstracts, case reports, conference presentations, editorials and expert opinions were excluded. Review articles were omitted because of potential publication bias and duplication of results. Authors were contacted in an attempt to obtain missing data.

2.3. Data extraction and critical appraisal

All data were extracted from article texts, tables and figures. Study characteristics data extracted included year of study, study period, institution location, country, cut-off for definition of "elderly", number of patients in the elderly cohort, number of patients in the younger cohort, study type, average follow-up and MVD surgical approach. Baseline demographics extracted included average age, proportion of males, laterality to the right or left, and distribution of pain (V1, V1+V2, V2, V2+V3, V1+V2+V3). Surgical findings included proportion of patients with affected vessel being posterior inferior cerebellar artery, anterior inferior cerebellar artery, superior cerebellar artery, basilar artery, vein or no vascular contact. Outcomes extracted included success rate, recurrence rate, partial success rate, deaths, strokes, thromboembolism, meningitis, cerebellar hematoma, cranial nerve deficit, diplopia, facial numbness, hearing loss, vertigo, and cerebrospinal fluid leak. Two investigators independently reviewed each retrieved article (K.P. and P. R.). Discrepancies between the two reviewers were resolved by discussion and consensus. Because quality scoring is controversial in meta-analyses of observational studies, two reviewers independently appraised each article included in this review according to the checklist of the Dutch Cochrane Centre proposed by Meta-analysis Of Observational Studies in Epidemiology (MOOSE). Discrepancies between the two reviewers were resolved by discussion and consensus. The final results were reviewed by the senior investigator (M.D.).

2.4. Statistical analysis

The relative risk (RR) was used as a summary statistic. In the present study, both fixed- and random-effect models were tested. In the fixed-effects model, it was assumed that treatment effect in each study was the same, whereas in a random-effects model, it was assumed that there were variations between studies. χ^2 tests were used to study heterogeneity between trials. The I^2 statistic was used to estimate the percentage of total variation across studies, owing to heterogeneity rather than chance, with values greater than 50% considered as substantial heterogeneity. I^2 can be calculated as $I^2 = 100\% \times (Q - df)/Q$, with Q defined as

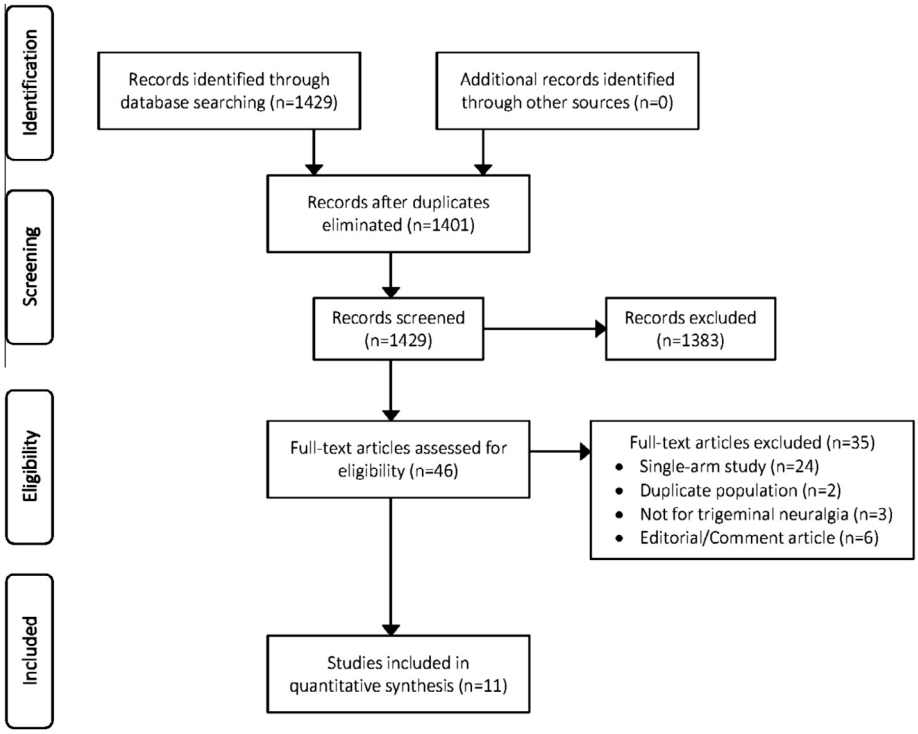

Fig. 1. Search strategy for systematic review on microvascular decompression for trigeminal neuralgia in the elderly *versus* younger population.