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Preliminary Literature Review of the Independent Association Between Peripheral Neuropathy and Falls in the Elderly

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Background

The risk of falling is increased by many factors and medical conditions including, the use of assistive devices; a history of previous falls and stumbles; poor balance; vertigo; syncopal episodes; lower extremity disability; vision and hearing impairment; prior stroke; cardiovascular disease; dysrhythmia; depression; and the use of certain medications, especially diuretics, sedatives, anxiolytics, antidepressants, and antipsychotics.

A factor that does not receive adequate clinical attention despite the fact that it is among the strongest predictors of falling is peripheral neuropathy. One reason for this lack of attention may be an assumption that peripheral neuropathy is simply a marker for some other factor such as CNS dysfunction or diabetes that is the true reason for the increased falling risk.

This preliminary literature review assesses the question of whether peripheral neuropathy is an independent predictor of falls in the elderly.

This review was based on a literature search performed on PubMed. The following keywords were used in various combinations: peripheral neuropathy, polyneuropathy, neuropathy, elderly and fall. Only English-language articles were considered. In all cases, the full text was reviewed. Citations from primary references were examined for additional articles that were not identified in the database search.

Review of Identified Studies

The following studies (listed in chronological order) were identified in a preliminary review of the literature. Additional studies may be identified in a further assessment of Pubmed abstracts and secondary citations.

Richardson and Hurvitz compared 20 subjects with a distal axonal peripheral neuropathy against 20 demographically matched controls.[1] A strength of this study was that peripheral neuropathy was confirmed by nerve conduction. The average age in both groups was 67 years. The authors found that 55% subjects with peripheral neuropathy fell in the prior year compared to 10% in the control group, giving an odds ratio (OR) of 17. Moreover, 7 of 9 subjects in the peripheral neuropathy group who did not fall reported regular stumbling or unsteadiness, while none of the controls subjects who did not fall reported such symptoms.

Koski and colleagues prospectively followed 373 elderly subjects (age ≥ 70 years) over a 2-year period who had a least one fall.[2] In the 151 subjects who were independent at the beginning of the evaluation period, 26% suffered a major injury (e.g., fractures). The independent predictors of incurring a major injury from falling were peripheral neuropathy (OR = 2.5) and insomnia (OR = 4.1). The authors concluded that more severe falls are associated with peripheral neuropathy.

Schwartz and colleagues prospectively followed 446 people with diabetes (mean age 74 years) for an average of 4.9 years.[3] In the first follow-up year, 23% reported any falls, followed by 22, 26, 30, and 31% in subsequent years. Peripheral neuropathy defined by nerve conduction (but not by monofilament testing or vibration perception threshold) was an independent predictor of fall risk (OR = 1.4 - 1.5) after correcting for blood pressure, diabetes characteristics and other disability such as vision loss.

Riskowski and colleagues prospectively followed 760 subjects as part of the MOBILIZE Boston Study for a mean of 2.8 years.[4] Peripheral neuropathy was determined using a structured monofilament exam (Health ABC Study method). Subjects with idiopathic peripheral neuropathy had a 70% greater risk of an incident fall than non-neuropathic subjects after adjustment for covariates associated with falls (e.g., visual acuity, medications).

Callaghan and colleagues analyzed Medicare claims and responses to the biennial Health and Retirement Study (HRS) survey over a 12 year period to estimate risk of falls before and after first diagnosis of peripheral neuropathy.[5] A total of 953 subjects with peripheral neuropathy and 953 propensity matched controls were evaluated. The average age of the subjects was 77 years. Among the subjects with peripheral neuropathy, 42% had diabetes. The authors reported that at the first HRS survey following diagnosis, subjects with peripheral neuropathy were more likely to have experienced at least one fall in the prior 2-years (46% vs. 36%). The authors estimated an OR of 1.41 for falling in the past 2-years at diagnosis of peripheral neuropathy. There was little difference in fall risk between subjects with and without diabetes. This study also showed that the risk of falling was increased up to 3-years prior to diagnosis, suggesting that traditional clinical detection of peripheral neuropathy lagged the onset of nerve pathology and the associated increased risk of falls.

Erlandson and colleagues prospectively followed 658 men over the age of 50; 279 with HIV and 379 without HIV.[6] A total of 263 men reported at least one fall (41% in HIV group, 39% in uninfected group). Peripheral neuropathy (impaired vibration at great toe) was independently associated with an elevated risk of falling (OR ~2) in both the HIV and non-HIV groups.

Kahn and colleagues evaluated 5,359 subjects with diabetes using peripheral neuropathy and fall surveys in a cross sectional design.[7] A total of 933 (17%) subjects reported at least one fall in the year prior to completing the survey. The presence of peripheral neuropathy was based on the Michigan Neuropathy Screening Instrument (MNSI). Subjects with peripheral neuropathy had a prevalence of falls that was 2.3 times higher than those without peripheral neuropathy. Peripheral neuropathy was also associated with an increased risk of fractures.

Cheng and colleagues prospectively followed 950 elderly (median 66 years, inter-quartile range 63 - 70 years) subjects with diabetes for 6-months to determine incident fall risk.[8] During this period, 133 falls occurred in 93 patients for a fall rate of 9.8%. Independent predictors of fall risk were determined using multivariable logistic regression. The predictors were female, fall history, use of walking aids, depression, fatigue and peripheral neuropathy. Use of walking aids (OR = 2.12) and peripheral neuropathy (OR = 2.14) were the strongest individual predictors.

Conclusion

Peripheral neuropathy is an independent predictor of falls in elderly patients with an OR of approximately 1.5 - 2.5. To put this risk in perspective, if an elderly patient has a baseline fall risk of 25% in the absence of peripheral neuropathy, then peripheral neuropathy increases the risk to as high as 45% (i.e., at OR = 2.5). This is a substantial increase at both the individual and population levels.

References

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