Do hip protectors help prevent hip fractures?

Van Schoor NM, Smit JH, Twisk JWR, Bouter LM, Lips P. Prevention of hip fractures by external hip protectors: a randomized controlled trial. *JAMA* 2003;289:1957-62.

Background: By 2050, the annual number of hip fractures occurring globally is expected to be 6.26 million. Given the anticipated treatment costs and a 1-year mortality of up to 33% following hip fractures, identifying strategies to reduce the number of hip fractures remains a topic of international importance. One potential strategy is the use of the hip protector, a device that absorbs or shunts away the energy of impact after a fall. Several randomized trials have evaluated the effectiveness of hip protectors among patients at risk of hip fractures;[1] however, conflicting results have been reported. Limitations of previous trials have included small samples and randomization of groups, not individuals.

Question: In an elderly population at high risk of hip fracture, is the time to first hip fracture longer among those who wear a hip protector than among those who do not?

Design: In the Amsterdam Hip Protector Study, people living in homes or apartment complexes for elderly people and nursing homes in Amsterdam and surrounding areas in the Netherlands were recruited and randomly assigned (1:1 ratio) either to the hip protector group or the control group. People were included if they were aged 70 years or more, had low bone density or risk factor(s) for falling, or both. Risk factors for falling included 1 or more falls during the 6 months before study entry, dizziness while standing up during the 2 weeks before study entry, stroke with neurological impairment, urinary incontinence, low physical activity, impaired mobility and cognitive impairment. Patients who were completely immobile, sustained a previous hip fracture or had prosthetic replacements bilaterally were excluded. For patients in the intervention group, a polypropylene hip protector of the energy-shunting type (Safehip; Tytex, Ikast, Denmark) was sewn into special underpants and positioned over the greater trochanter. Compliance was assessed by unannounced visits by a research assistant at 1, 6 and 12 months after study entry.

The primary outcome measure was time to first hip fracture. Patients were asked to complete calendars of falls and fractures weekly and submit them to study personnel every 3 months for at least 1 year. A Cox proportional hazards model was used to determine the risk of hip fracture after adjustment for potential confounding variables (e.g., type of home, age, sex, cognitive impairment, bone density and risk factors for falling). Analysis was performed on an intention-to-treat basis and a per-protocol basis.

Results: Of 830 people screened at 45 locations between March 1999 and March 2001, 561 were eligible and randomly assigned to the hip protector group (n = 276) or the control group (n = 285). One-year follow-up data were available for 383 (68%). There were 18 hip fractures in the hip protector group and 20 in the control group. Four fractures in the intervention group occurred while the person was wearing a hip protector. Survival time until death was similar between the intervention and control groups (83 and 79 respectively, p = 0.31). In the multivariate analysis, the time to first hip fracture did not differ significantly between the 2 groups (hazard ratio [HR] 1.05, 95% confidence interval [CI] 0.55–2.03). In addition, the per-protocol analysis of compliant participants did not show a statistically significant difference between the groups in the time to first hip fracture (HR 0.77, 95% CI 0.25–2.38).

Commentary: The results of this large randomized controlled trial are similar to those of 2 other large randomized trials that showed nonsignificant differences in fracture risk between the intervention and control groups.[2,3] They contradict the findings of a systematic review involving a total of 3553 patients that reported a lower fracture rate with than without hip protectors (2.2% v. 6.2%);[1] however, a number of negative studies were not included in this review, and the largest studies included were based on cluster randomization and not individual randomization. The validity of the nonsignificant results in the current trial may be limited by low compliance rates in the intervention group (37% at 1 year) and a 32% loss to follow-up. However, the per-protocol analysis involving only the compliant patients showed no statistically significant difference between the groups. Although the authors were careful to ensure adequate study power a priori, the realized power of the study for a 75% risk reduction with hip protectors was 74%. Recent studies suggest that a 75% risk reduction may be an overestimate of treatment effect.

Practical implications: This trial provides further evidence that hip protectors may not be as effective as previously reported. Whether it is due to a lack of compliance with the hip protector, the lower than expected effectiveness of the device, or both, current evidence suggests that there is no added benefit to the use of hip protectors by patients at risk of hip fracture.

Mohit Bhandari
Department of Clinical Epidemiology and Biostatistics
Division of Orthopaedic Surgery
McMaster University
Hamilton, Ont.

References

1. Parker MJ, Gillespie LD, Gillespie WJ. Hip protectors for preventing hip fractures in the elderly [review]. *Cochrane Database Syst Rev* 2001;(2):CD001255.
2. Hildreth R, Campbell P, Torgerson I. A randomized controlled trial of hip protectors for the prevention of second hip fractures. *Osteoporos Int* 2001;12:S13.
3. Hubacher M, Wettstein A. Acceptance of hip protectors for hip fracture prevention in nursing homes. *Osteoporos Int* 2001;12:794-9.

© 2003 Canadian Medical Association or its licensors