

Gender-specific Issues in Orthopaedic Surgery

Editorial Comment

Tamara D. Rozental MD

Published online: 28 January 2010
© The Association of Bone and Joint Surgeons® 2010

While we have long been aware that diseases affect men and women differently, progress towards understanding the root causes of these differences has been slow. The last decade, however, has seen a dramatic increase in research examining gender disparities in the prevalence, diagnosis, and treatment of many diseases. In particular, gender has an important effect on many musculoskeletal conditions ranging from osteoarthritis to osteoporosis and fracture care.

In 2004, the American Academy of Orthopaedic Surgeons and National Institutes of Health organized a workshop to explore advances in gender-based characteristics of musculoskeletal health. At the time, six priorities were identified for future musculoskeletal research [15]: (1) Monitor gender differences and similarities for all musculoskeletal diseases and conditions; (2) Conduct and design longitudinal and cross-sectional studies of musculoskeletal conditions allowing results to be analyzed by gender; (3) Make gender-specific data in musculoskeletal diseases and conditions more readily available; (4) Mine cross-species information and develop relevant *in vivo* and *in vitro* models that incorporate the biologic clock. Stratify human and animal studies of musculoskeletal diseases and conditions based on gender; (5) Expand research on gender differences in neural organization and function, pain and analgesia with respect to musculoskeletal diseases and conditions; (6) Promote research on gender differences at the molecular, cellular and tissue level with specific emphasis in musculoskeletal diseases and conditions.

Although we are still far from reaching many of these goals, researchers are increasingly focusing on gender differences in the practice of orthopaedic surgery. While some of these findings have been widely discussed in the popular media, others remain underappreciated by the orthopaedic community. This symposium provides a sample of cutting-edge, original research analyzing the effects of sex and gender on the treatment and outcomes of musculoskeletal conditions. Given that these topics are not limited to a single discipline, the task is a challenging one. We present a variety of themes in hopes of touching upon the many subspecialties that have contributed to this growing field of study.

Gender differences in osteoarthritis have perhaps received the greatest degree of attention. The prevalence of the disease is higher in women [11]. Genetic [1], anatomical [6] and physiological [3] factors have been suggested to contribute to the disease burden [10]. Although men and women with advanced osteoarthritis typically present with similar symptoms, disparities in the rate of treatment have been reported, with most studies pointing towards underuse of total joint arthroplasty among women [5]. More detailed assessments of outcomes following total joint arthroplasty will be helpful in allowing physicians to tailor and optimize treatment methods.

Responsible for 1.5 million annual fractures in the United States, osteoporosis has also been the focus of intense research. Approximately 80% of those affected by osteoporosis are women and 50% of women over the age of 50 will have a fragility fracture in their lifetime [9]. Studies persistently demonstrate ineffective physician practices in adequately evaluating and treating patients for osteoporosis, particularly after fragility fractures [4, 14]. Continuing resources should be dedicated to identifying populations at risk and initiating appropriate preventive strategies.

T. D. Rozental (✉)
Department of Orthopaedic Surgery, Harvard Medical School/
Beth Israel Deaconess Medical Center, 330 Brookline Avenue,
Stoneman 10, Boston, MA 02215, USA
e-mail: trozenta@bidmc.harvard.edu



Fig. 1 Tamara D. Rozental, MD is shown.

In addition to osteoarthritis and osteoporosis, investigators have identified several other conditions that disproportionately affect the sexes [8, 13]. Furthermore, many authors are focusing on analyzing differences in outcomes and health-care utilization rates between men and women [7, 12]. These efforts should be encouraged and developed.

Graduate medical education is another subject that deserves special mention. Orthopaedic surgery continues to lag behind other surgical specialties in attracting female residents, and successful recruitment begins early in medical school [2]. Orthopaedic surgeons should thus actively engage students through mentoring programs and ensure that residency training meet the needs of female and male trainees alike.

This symposium presents some of the more recent data examining differences between men and women in orthopaedic surgery. Observational studies as well as comparative series and basic science research are included among the highlighted papers. I am indebted to the talented group of individuals who contributed articles towards its publication, and hope that the work presented will encourage others to follow in their footsteps.

References

1. Bergink AP, van Meurs JB, Loughlin J, Arp PP, Fang Y, Hofman A, van Leeuwen JP, van Duijn CM, Uitterlinden AG, Pols HA. Estrogen receptor alpha gene haplotype is associated with radiographic osteoarthritis of the knee in elderly men and women. *Arthritis Rheum.* 2003;48:1913–1922.
2. Blakemore LC, Hall JM, Biermann JS. Women in surgical residency training programs. *J Bone Joint Surg Am.* 2003;85:2477–2480.
3. Faber SC, Eckstein F, Lukasz S, Mühlbauer R, Hohe J, Englmeier KH, Reiser M. Gender differences in knee joint cartilage thickness, volume and articular surface areas: assessment with quantitative three-dimensional MR imaging. *Skeletal Radiol.* 2001;30:144–150.
4. Gong HS, Oh WS, Chung MS, Oh JH, Lee YH, Baek GH. Patients with wrist fractures are less likely to be evaluated and managed for osteoporosis. *J Bone Joint Surg Am.* 2009;91:2376–2380.
5. Hawker GA, Wright JG, Coyte PC, Williams JJ, Harvey B, Glazier R, Badley EM. Differences between men and women in the rate of use of hip and knee arthroplasty. *N Engl J Med.* 2000;342:1016–1022.
6. Hitt K, Shurman JR II, Greene K, McCarthy J, Moskal J, Hoeman T, Mont MA. Anthropometric measurements of the human knee: correlation to the sizing of current knee arthroplasty systems. *J Bone Joint Surg Am.* 2003;85(Suppl 4):115–122.
7. Holbrook TL, Hoyt DB. The impact of major trauma: quality-of-life outcomes are worse in women than in men, independent of mechanism and injury severity. *J Trauma.* 2004;56:284–290.
8. Knowles SB. Is there an injury epidemic in girls' sports? *Br J Sports Med.* 2010;44:38–44.
9. National Osteoporosis Foundation Web site. Available at: <http://www.nof.org/osteoporosis/diseasefacts.htm>. Accessed December 16, 2009.
10. O'Connor MI. Osteoarthritis of the hip and knee: sex and gender differences. *Orthop Clin North Am.* 2006;37:559–568.
11. Peyron JG, Altman RD. The epidemiology of osteoarthritis. In: Moskowitz RW, Howell DS, Goldberg VC, Mankin HJ, eds. *Osteoarthritis: Diagnosis and Management.* 2nd ed. Philadelphia, PA: WB Saunders; 1992:15–37.
12. Probst C, Zelle B, Panzica M, Lohse R, Sitarro NA, Krettek C, Pape HC. Clinical re-examination 10 or more years after polytrauma: is there a gender related difference? *J Trauma.* 2009 Dec 4. [Epub ahead of print].
13. Quatman CE, Myer GD, Khoury J, Wall EJ, Hewett TE. Sex differences in “weightlifting” injuries presenting to United States emergency rooms. *J Strength Cond Res.* 2009;23:2061–2067.
14. Rozental TD, Makhni EC, Day CS, Boussein ML. Improving evaluation and treatment for osteoporosis following distal radial fractures. A prospective randomized intervention. *J Bone Joint Surg Am.* 2008;90:953–961.
15. Tosi LL, Boyan BD, Boskey AL. Does sex matter in musculoskeletal health? The influence of sex and gender on musculoskeletal health. *J Bone Joint Surg Am.* 2005;87:1631–1647.