



# Gendered Innovations in Orthopaedic Science

## Gendered Innovations in Orthopaedic Science: Equal But Different

Alexandra E. Page MD

I am tough. I made it through internship. I made it through residency. I survived toddlers and teenagers. But I am not Ranger tough. When two remarkable women were lauded for the receiving their US Army Ranger tabs last fall [9], it gave me pause. I quivered at the starting point for Ranger school: 49 push-ups, 59 sit-ups, 5-mile run in under 40 minutes, and six chin-ups. In fact, the likelihood of graduating Ranger school is low unless one far exceeds even those standards [11], and fitness tests are

only the beginning. Army Rangers also undergo weeks of endurance operations under conditions of privation, testing their stamina. Most notably, these two women achieved their status meeting sex-agnostic criteria. They proved themselves as tough as the guys.

Their achievement prompted me to consider how physiologic differences between males and females, as well as gender-based cultural differences, influence the professional choices we make. The two women who earned their Ranger tabs overcame physical and cultural barriers. Are women in orthopaedics that much different? The body needs to meet the physical demands of the job, whether it is marching with a 50-lb. backpack like

US Army Rangers or pounding in a femoral rod like orthopaedic surgeons. These barriers can be overcome by brute force and sheer will. But sometimes we find workarounds.

### Physical Barriers and Solutions

As a junior resident, joint reductions terrified me. They seemed an exercise in machismo, and the senior residents were far stronger than I. There was plenty of sweating and grunting. Of course, I trained in an era just emerging from the Hippocratic foot-in-the-axilla-and-pull-until-you-create-a-brachial-plexopathy theory of shoulder reduction. Now, sedation and a hanging weight provides an easier solution for surgeons and patients. Reducing hips required leveraging my assistants' bulk, so I appreciated when the East Baltimore Lift [10] technique came around.

One of the challenges as a woman is learning ways to level out the physical demands in orthopaedics. We get these tips from our mentors. For elbow reductions, I remain grateful to a woman in her hand fellowship during my PGY-2 year. After I struggled with

#### Note from the Editor-in-Chief:

We are pleased to introduce to readers of *Clinical Orthopaedics and Related Research*® our new “Gendered Innovations in Orthopaedic Science” columnist, Alexandra E. Page MD. Dr. Page is a private practice orthopaedic surgeon from San Diego, CA, USA and serves as the Ruth Jackson Orthopaedic Society representative to the AAOS Board of Specialties Communications Committee. She provides commentary on sex and gender similarities and differences in orthopaedics.

The author certifies that she, or any members of her immediate family, have no funding or commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research*® editors and board

members are on file with the publication and can be viewed on request.

The opinions expressed are those of the writers, and do not reflect the opinion or policy of *Clinical Orthopaedics and Related Research*® or The Association of Bone and Joint Surgeons®.

A. E. Page MD  
Musculoskeletal Health Care Solutions,  
La Jolla, CA, USA

A. E. Page MD (✉)  
Private Practice, 3750 Convoy Street,  
Suite 116, San Diego, CA 92111, USA  
e-mail: alexe.page@gmail.com

# Gendered Innovations in Orthopaedic Science

traction and flexion, she adroitly demonstrated placing her forearm over the patient's forearm to achieve both forces at once. The Archimedes example ("Give me a place to stand with a lever and I shall move the whole world") remains in my head whether cutting pins or removing hardware.

But sometimes orthopaedics is just about the muscle. That same PGY-2 year, struggling to insert a traction pin by hand drill into the hard femur of a 20-something, I looked at my supervising chief resident for help. His look was supportive but firm. No words passed but the answer was clear: Just get it done. Later in the year, he confessed he wanted to help but knew I needed to learn. It was a requirement for the job, and he taught me the right lesson. Like the move from hand-to-hand combat to remote warfare and drones, power tools have eliminated some of the orthopaedic surgery "standards" which could have been barriers of entry to the gentler sex. Regardless, orthopaedics demands a little more elbow grease than does, say, dermatology.

## Cultural Barriers

Col. (Ret.) Kathleen McHale MD served in the US Army for 22 years, a career spanning active deployments in the Balkans, to Chief of Orthopaedics

at Walter Reed Army Medical Center, to Orthopaedic Surgery Consultant to the Surgeon General of the Army. Dr. McHale, who now practices pediatric orthopaedics in the Washington DC area, remarked that while the US military will continue to implement uncompromisingly high standards, it is beginning to understand that combat circa 2016 bears little resemblance to wars of previous eras. Tactical thinking is as important an attribute as the ability to carry and load heavy artillery. In this sense, the military is at least publically willing to open the door to both sexes rather than adhering to a rigid set of physical requirements that heavily favors males.

But perhaps the hardest barrier to overcome is a professional culture that seeks to exclude. A recent report from the RAND National Defense Research Institute Corporation [12] assessed the future role for women in Special Operation Forces (SOF). Interviews held with SOF personnel led to a distressing conclusion: "Opposition [includes] the belief among SOF that women do not have the physical and other capabilities to meet the demands ... coupled with deep concern that performance standards may nonetheless be lowered to enable women to qualify for their specialties" [12].

Fortunately in orthopaedics, such overt discrimination has largely disappeared, but the reputation still exists

[3, 7]. A culture of acceptance supports surgeons of differing physical strengths, and encourages potential candidates who may doubt their ability to meet the physical demands of the profession. As mentors, experienced surgeons should explore and share alternative tools and techniques to get the job done. More importantly, in training programs and in practice, true professionalism should include offering nonjudgmental assistance if a resident or colleague asks for help. With our patients, encouraging pursuit of goals despite injuries and focusing on the possibilities rather than the obstacle can help lower cultural barriers to physically demanding professions.

## Injury and Prevention

Pushing ourselves farther than expected creates forward progress, but can bring unintended consequences. By requiring women to meet standards established for men, are we subjecting them to situations likely to cause injury? Studies have demonstrated higher rates of injury among female US Army recruits, at 55% during 8-week basic training versus 25% for males [5]. Further, being female has been identified as an independent risk factor for injury, notably stress fractures [4, 6]. Deployment-related injuries are more severe with

# Gendered Innovations in Orthopaedic Science

lower return to duty for women [8]. Such disparate rates raise concerns that valuable members of the military risk eliminating themselves through injury as they push towards more elite physical standards established on the male physiology.

As more women move into physically demanding civilian jobs such as police and the fire department, many orthopaedic surgeons may see more workplace-related musculoskeletal injuries. Further, multiple studies demonstrate [2, 13, 14] a female preponderance and/or poorer recovery after occupational injuries. As physicians treating musculoskeletal injuries, recognizing both the higher potential for injury and possibly poorer outcome is important for helping to set expectations for our patients and work with them to achieve recovery.

Research on military recruits does provide some optimism, finding that some portion of the injury differential may be related to intrinsic fitness independent of sex [1]. Correcting overall cardiovascular and strength status can have a protective effect. The same report assessed physiologic differences, noting average male superiority on strength and endurance testing, but also the sex equivalency on aspects of flexibility and balance. Such studies support that women can successfully reach gender-neutral standards. As women push back

barriers in the military, a similar trend likely will continue in the civilian sector, including orthopaedics. Ongoing research about women in high-demand training and professions can inform injury prevention, treatment, and guidance on return to work in this challenging population.

I will never achieve the number of miles, push-ups, sit-ups, and chin-ups that I would need to qualify or even to apply for Ranger school. However, encouraging women to consider orthopaedic surgery as a career, as well as treating and supporting women who push the boundaries of their own physical abilities, brings me as much honor as a Ranger tab.

## References

- Bell NS, Mangione TW, Hemenway D, Amoroso PJ. High injury rates among female Army trainees: A function of gender? *Am J Prev Med.* 2000;18:141–146.
- Fan JK, McLeod CB, Koehoorn M. Sociodemographic, clinical, and work characteristics associated with return-to-work outcomes following surgery for work-related knee injury. *Scand J Work Environ Health.* 2010;36:332–338.
- Hill JF, Yule A, Zurakowski D, Day CS. Residents' perceptions of sex diversity in orthopaedic surgery. *J Bone Joint Surg Am.* 2013;95:e1441–1446.
- Jones BH, Bovee MW, Harris JM, Cowan DN. Intrinsic risk factors for exercise-related injuries among male and female army trainees. *Am J Sports Med.* 1993;21:705–710.
- Jones BH, Knapik JJ. Physical training and exercise-related injuries. Surveillance, research and injury prevention in military populations. *Sports Med.* 1999;27:111–125.
- Mattila VM, Niva M, Kiuru M, Pihlajamäki H. Risk factors for bone stress injuries: A follow-up study of 102,515 person-years. *Med Sci Sports Exerc.* 2007;39:1061–1066.
- My summer in orthopedic surgery. Available at: <http://in-training.org/summer-orthopedic-surgery-9796>. Accessed January 7, 2016.
- Rivera JC, Hylden CM, Johnson AE. Disability after deployment injury: Are women and men service members different? *Clin Orthop Relat Res.* 2015;473:2448–2454.
- Sanchez R, Smith-Spark L. Two women make Army ranger history. Available at: <http://www.cnn.com/2015/08/21/us/women-army-ranger-graduation/>. Accessed April 25, 2016.
- Schafer SJ, Anglen JO. The East Baltimore Lift: A simple and effective method for reduction of posterior hip dislocations. *J Orthop Trauma.* 1999;13:56–57.
- Smith S. Preparing for Army ranger school. Available at: <http://www.military.com/military-fitness/army-special-operations/army-ranger-school-prep>. Accessed April 25, 2016.
- Szayna TS, Larson EV, O'Mahony A, Robson S, Schaefer AG, Matthews M, Polich JM, Ayer L, Eaton D, Marcellino W, Miyashiro L, Posard M, Syme J, Winkelman Z, Wright C, Zander-Cotugno M, Welser W.

# Gendered Innovations in Orthopaedic Science

Considerations for integrating women into closed occupations in the U.S. special operations forces. Available at: [http://www.rand.org/pubs/research\\_reports/RR1058.html](http://www.rand.org/pubs/research_reports/RR1058.html). Accessed April 25, 2016.

13. Taiwo OA, Cantley LF, Slade MD, Pollack KM, Vegso S, Fiellin MG, Cullen MR. Sex differences in injury patterns among workers in heavy manufacturing. *Am J Epidemiol*. 2009;169:161–166.

14. Tessier-Sherman B, Cantley LF, Galusha D, Slade MD, Taiwo OA, Cullen MR. Occupational injury risk by sex in a manufacturing cohort. *Occup Environ Med*. 2014;71:605–610.