Challenges of the upper limb

The human upper limb is made for prehension. The capacity to manipulate and to interact with the environment is effected through the hand. The hand is a grasping tool, with four fingers flexing against an opposed thumb. It is also the main tactile organ, permits self-expression, and uniquely identifies an individual. The remainder of the upper limb combines to position the hand in space within a wide radius of curvature. Any failure of one component may dramatically affect the utility of the end organ – the hand.

Great advances have been made in the diagnosis and management of disorders of the upper limb, as well as musculoskeletal disorders in general, over the past 50 years. The Bone and Joint Decade Movement, endorsed by the United Nations, was established in 1999 as the driving force for improving the care of people with musculoskeletal disorders and injuries. As it draws to a close, it becomes necessary to reflect upon what has so far been achieved, and the challenges that remain.

The articles in the upper limb symposium in this issue offer an opportunity to review the understanding of a common condition (carpal tunnel syndrome), a controversial subject (thoracic outlet syndrome), and a condition that has seen dramatic surgical advances (glenohumeral osteoarthritis).

Carpal tunnel syndrome is now considered to be a defined clinical entity. However, until the advent of electrophysiological testing in the 1940s, no unanimous pathophysiological explanation existed. Debate continues regarding the exact cause of damage to the nerve within the carpal tunnel, although a popular theory suggests abnormally high carpal tunnel pressures leading indirectly to neural ischaemia. Surgery for carpal tunnel syndrome is one of the most commonly performed procedures. In the United States, more than 350 000 carpal tunnel procedures are performed annually (Owings and Kozak, 1998). Open carpal tunnel release may result in a painful hypertrophic scar or pillar pain. Endoscopic techniques have been developed in an attempt to reduce postoperative pain and accelerate return to work. However, they have not been widely accepted, involve a considerable learning curve and in one randomized controlled trial the improvement in pain scores at 3 months was only modest, with no advantage regarding length of work absence (Atroshi et al, 2006).

Prosthetic shoulder arthroplasty has become increasingly popular. The first series was reported by Neer (1955) for fracture-dislocations of the proximal humerus, aiming for restoration of normal anatomy. Since then, there has been progressive improvement, and prosthetic arthroplasty of the shoulder is now used widely to treat glenohumeral osteoarthritis, rheumatoid arthritis and osteonecrosis, with good and reproducible results. Long-term studies show highly favourable outcomes. A series of 320 total shoulder arthroplasties has shown over 90% patient satisfaction at 10 years, with 85% survivorship at 20 years (Deshmukh et al, 2005).

Other designs have evolved. Bone-conserving resurfacing arthroplasty and reverse geometry prostheses have widened the age range and indications for which surgery can relieve pain and restore shoulder function. Computer-assisted navigation systems allow greater accuracy of implant positioning. Since the pioneering work by Watanabe in the 1950s, arthroscopic diagnosis and treatment of shoulder conditions continues to evolve. The future of arthroscopic shoulder surgery will rely upon advances in both instrument technology and cell biology. Tissue engineering is already in use, exemplified by autologous chondrocyte transplantation. Arthroscopic joint resurfacing using a polymer-hydrogel composite is being trialled. It may represent the future for surgical treatment of osteoarthritis and render conventional joint replacement obsolete.

It is better still to arrive at a state where surgery becomes redundant. In the case of rheumatoid arthritis, morbidity has been reduced by starting second-line therapy as early as possible, and introducing biological agents (anti-TNF agents, others that reduce pro-inflammatory cytokines and now anti-CD-20 antibodies directed against B-cells). At a more fundamental level, the key to a cure depends on understanding the triggers that provoke a change from acute inflammation to chronic, stable established rheumatoid arthritis, thereby eliminating the synovial pannus tissue that drives chronic rheumatoid arthritis. In the case of osteoarthritis, a better understanding of the basic biology of osteoarthritis is still required, together with the validation of magnetic resonance imaging and biochemical markers of osteoarthritis development and progression. If surgery is required, it can be directed at improving pain and function earlier in the disease process. BJHM

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KEY POINTS

- Care of upper limb disorders has benefited from dramatic improvements in orthopaedic surgery and rheumatology.
- Advances in shoulder joint replacement surgery have led to increased use, predictable results and good long-term outcomes.
- Many arthroscopic surgical techniques have replaced open surgery with equal or better outcomes, shorter stay and lower morbidity.
- Many challenges remain for basic scientists, rheumatologists and surgeons in the preclinical detection and clinical management of arthritis.