A Systematic Review of Outcomes Reporting for Brachial Plexus Reconstruction

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Purpose To better understand the manner in which outcomes are reported after brachial plexus reconstruction, we conducted a systematic review of the scientific literature.

Methods We included English-language articles describing treatment of brachial plexus injuries to restore motor function of the shoulder, elbow, forearm, and/or wrist with nerve repair, nerve graft, and/or nerve transfer. We recorded the anatomical location of injury, the treatment used, and the manner in which motor function, active and passive range of motion, pain, quality of life, function or disability, patient satisfaction, and psychosocial health was reported.

Results In reviewing 88 papers with outcomes for 5,189 patients, 83 (94%) of the papers reported postoperative motor function. Of these, 49 (59%) did not include any other measures of patient outcome. Active range of motion was reported in 24 (27%) studies, pain was reported in 15 (17%) studies, quality of life was reported in 4 (5%) studies, function or disability was reported in 5 (6%) studies, patient satisfaction in 3 (3%) studies, and psychosocial health in 1 study.

Conclusions To date, outcome reporting for brachial plexus surgery has largely centered on motor recovery and typically has not included measures of function or nonmusculoskeletal recovery. Incorporating currently used measures of physical recovery with patient-derived outcomes measures such as quality of life, function, pain, and satisfaction will likely help provide a more comprehensive understanding of the effect of brachial plexus reconstruction surgery. *(J Hand Surg Am. 2015;40(2):308–313. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Diagnostic III.

Key words Brachial plexus, nerve transfer, nerve repair, outcomes, reporting.

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Received for publication February 5, 2014; accepted in revised form October 14, 2014.

The authors thank Rie Smethurst, MLS (Hospital for Special Surgery, New York, NY), for her assistance with the literature search conducted for this manuscript.

This investigation was funded by a grant from the National Institute of Arthritis and Musculoskeletal and Skin Diseases (T32-AR07281 for C.J.D.).

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

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0363-5023/15/4002-0017$36.00/0
http://dx.doi.org/10.1016/j.jhsa.2014.10.033

Surgeons, patients, and society invest a considerable amount of resources in the treatment of brachial plexus injuries (BPI). Despite this investment, the various postsurgical outcomes for BPI patients remain difficult to precisely predict because each BPI pattern and treatment are unique.[1,2] As surgical techniques and treatment strategies for brachial plexus injuries have advanced rapidly, there has been a contemporaneous increase in the emphasis on patient-reported measures in clinical research.[3] Because improvement after surgery cannot be adequately evaluated using only clinician grading of muscle strength, a more all-encompassing perspective is necessary to reflect a patient's functional recovery.

Although the need to enhance the reporting of outcomes after brachial plexus surgery has been previously articulated,[4–6] the urgency to accomplish this task is growing. As competition for health care resources continues to grow, clinicians and researchers must demonstrate that brachial plexus surgery can deliver reliable and valuable outcomes.[7] To inform these ongoing efforts, we performed a systematic review of the literature with the aim of better understanding the manner in which outcomes after brachial plexus nerve reconstructive surgery are currently reported. We hypothesized that existing literature was focused largely on clinician grading of muscle function with minimal emphasis on patient-centered outcomes.

METHODS

Literature search

We performed a search of the English-language literature using the PubMed/MEDLINE (search conducted on July 15, 2013), EMBASE (search conducted on August 25, 2013), and Cochrane Central Register of Controlled Trials (search conducted on August 25, 2013) databases (all years considered up to the date of the searches). We searched these databases using the following key words: "brachial plexus" or "brachial plexus neuropathies" AND "surgery" or "surgical treatment" or "reconstruction" AND "outcomes" or "assessments." The searches were conducted by a medical librarian, who expanded each of these key words into corresponding Medical Subject Heading terms. Following elimination of duplicate search results, this produced 1,499 articles. The titles and abstracts were separately reviewed by 2 investigators (C.J.D. and P.T.) to exclude articles unrelated to our topic. Full-length papers were then read separately by the same 2 investigators to ensure that the article met the inclusion and exclusion criteria for our study. We then performed a manual reference check of all remaining articles to identify any additional studies for inclusion. Formal review of the papers was conducted autonomously by the same 2 reviewers using a data extraction form that was designed prior to the literature search. Any disagreement between the 2 reviewers during this process was resolved through discussion under the guidance of the senior author. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses[8,9] guidelines were adhered to in the reporting of our systematic review.

Inclusion and exclusion criteria

We included articles that met all of these criteria: English-language full text; treatment of brachial plexus injuries to restore motor function of the shoulder, elbow, forearm, and/or wrist; and treatment with nerve repair, nerve graft, and/or nerve transfer. During review of titles and abstracts, we excluded articles that described cadaveric or nonhuman studies; regional anesthesia of the brachial plexus; peripheral nerve injuries (distal to the axilla); literature reviews, technique descriptions, expert opinion; and obstetric or neonatal brachial plexus injuries (Fig. 1). During review of full-length papers, we excluded articles that described only reconstruction for oncological cases, those that described nerve surgery to treat sensory deficits after BPI, and those in which data presentation was insufficient for extraction. Articles that described only reconstructive muscle transfer, tendon transfer, and arthrodesis were excluded from the study to optimize the homogeneity of the cohort, because evaluation of the use of clinician grading of muscle function was one of the primary outcomes of the current study.

Data extraction

Eligible articles were formally reviewed autonomously by 2 reviewers (C.J.D. and P.T.) to collect data regarding the origin of each article, information regarding the injury and treatment, and the outcomes measures recorded. Regarding quality of life and function or disability, particular attention was directed to the Short Form 36 (SF-36) and Disabilities of the Arm, Shoulder, and Hand (DASH), respectively, because these measures have been validated in patients with musculoskeletal injury.[8,10] We evaluated whether an assessment of patient satisfaction (using any measure) was obtained. We also evaluated whether the articles included any measure of psychosocial health (such as anxiety, regret, loss of independence, concern with appearance, and effect on personal relationships). Reported outcomes of studies were viewed within the perspective of the complete cohort of papers and also subcategorized by the continent on which the study was conducted and the time period of study publication.

RESULTS

Study retrieval

A total of 88 papers reviewing outcomes for 5,189 patients remained for data extraction after application of all inclusion and exclusion criteria (Fig. 1). Thirty-four of the investigations were performed in Asia, 22 in Europe,19 in North America, 9 in South America, 3 in Africa, and 1 in Australia. The median year of publication was 2007 and the mode year of publication was 2011. The earliest year of publication was