The appearance of the median nerve during carpal tunnel release: Reliability of the surgeon's grading of the degree of compression

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SJ McCabe. The appearance of the median nerve during carpal tunnel release: Reliability of the surgeon's grading of the degree of compression. Can J Plast Surg 1994;2(4):169-170. The reliability of intraoperative grading of the degree of compression of the median nerve during carpal tunnel release has never been tested, even though the appearance of the median nerve at the time of release may contain valuable information regarding the degree of compression. This study used a survey design with high-quality colour photographs of the median nerve at the time of carpal tunnel release to test the reliability of 30 surgeons grading the degree of compression. An important degree of disagreement was found in 11% of the scores. The calculated reliability of 0.68, while not high enough to make individual treatment decisions based on the appearance of the nerve, is high enough to group patients for the purposes of clinical research.

Key Words: *Carpal tunnel syndrome, Median nerve, Reliability*

Aspect du nerf médian lors de la décompression du tunnel carpien : fiabilité de l'évaluation visuelle faite par le chirurgien

RÉSUMÉ : La fiabilité de l'évaluation peropératoire du degré de compression du nerf médian durant une intervention de décompression n'a encore jamais été mesurée, même si l'aspect du nerf médian au moment de la décompression pourrait révéler certains renseignements utiles à ce sujet. Cette étude se fonde sur un modèle de questionnaire, à l'aide de photographies couleur de grande qualité du nerf médian au moment de la décompression pour vérifier l'aptitude de 30 chirurgiens à mesurer avec précision le degré de compression. Une discordance marquée a été observée dans 11 % des scores enregistrés. La fiabilité calculée, de l'ordre de 0,68, quoique trop peu élevée pour prendre des décisions thérapeutiques individuelles sur la seule base de l'aspect du nerf, est suffisamment grande pour stratifier les patients à des fins de recherche clinique.

"Before one can obtain evidence that an instrument is measuring what is intended, it is first necessary to gather evidence that the scale is measuring *something* in reproducible fashion" (1). This is the essence of reliability, which is expressed by the numbers 0 to 1.0, with 0 being no reliability and 1.0 indicating perfect reliability.

The degree of reliability required for a measurement instrument will depend on the intended use of the measurement. If the measurement score will be used to make decisions about individual patients, a very high reliability, approaching 0.9, should be achieved by the instrument (1). If, however, the scores will be used simply to compare groups

for clinical research purposes, a measurement system with a much lower reliability can be accepted. At the time of carpal tunnel release, the appearance of the median nerve contains potentially valuable information regarding the degree of compression of the nerve. Such information could be useful for verification of the diagnosis of carpal tunnel syndrome, planning of the operative procedure, and predicting the prognosis following release. In addition, if the physician was evaluating a patient with a failed carpal tunnel release, a clear report of the degree of compression seen in the operating room could aid in subsequent management.

Typically, surgeons make an intraoperative estimate of the degree of compression of the nerve during carpal tunnel release. If the surgeon's intraoperative grading of the degree of the compression was a reliable measure, this potentially useful information could be of great clinical and research value.

The purpose of this study was to determine if different

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surgeons, looking at identical, high-quality photographs of the median nerve at the time of carpal tunnel release, would grade the nerve as having the same degree of compression.

MATERIALS AND METHODS

The Christine M Kleinert Institute for Hand and Micro Surgery has developed a national network of hand surgeons to coordinate and perform clinical research in the areas of hand and microsurgery. This network currently involves about 200 former hand surgery fellows of the institute. From the network, 30 hand surgeons were randomly chosen for this study.

Each of the 30 surgeons was mailed an identical series of 13 high-quality 5 x 7 colour photographs of the median nerve during 13 different carpal tunnel procedures. The photographs were chosen to represent the range of compression seen in the clinical situation. Each surgeon was then asked to score the degree of compression seen for each median nerve as 'none', 'mild', 'moderate', 'severe' or 'extreme'. These terms were chosen because they are commonly seen in operative reports of carpal tunnel release. No definition for these terms were included, just the terms themselves.

The scores were tabulated, and analysis of variance (ANOVA) was used to calculate the reliability using a standard formula.

RESULTS

A response rate of 100% was achieved. Several participants, however, did not grade all photographs. The scores of three surgeons not grading more than two photographs were excluded, leaving 27 for the final analysis.

Not surprisingly, frequent disagreement was found among the surgeons on the degree of compression shown in the photographs. Importantly, assuming that disagreement by two levels or more is significant, of the 4563 possible comparisons, there was significant disagreement in 11% of the scores. Examples of such disagreements included ratings of the degree of compression of a photograph of the same nerve as none and moderate, mild and severe, or moderate and extreme. There was disagreement on the ratings by three or four levels in only 1% of the responses. In this situation, the same photograph would be rated as none and severe by different surgeons.

Most of the disagreement in grading was evident in the central range of the scale, with more agreement when the nerve seemed to be significantly constricted or essentially normal. The reliability coefficient for the grading scale was 0.68.

DISCUSSION

Clearly, the reliability of 0.68 noted in this study is not high enough for the intraoperative appearance of the nerve to be used to direct the need for a modification of the surgical

technique, eg, the need for neurolysis. However, the reliability of the scoring system is high enough to be used to define groups of patients for research purposes.

This study used high-quality photographs of the median nerve taken at the time of carpal tunnel release as a representation of the actual appearance of the nerve. In clinical practice, the surgeon may use other information to grade the degree of compression that cannot be captured by still photography, such as the vascular response to tourniquet deflation. It is unknown if adding this other information would improve the reliability of the measurement of the degree of compression, but if the appearance of the nerve were to be used to guide treatment considerations for an individual patient, such information factors should be studied to determine their influence.

Another factor to consider was that no teaching was performed to standardize the criteria used to determine each level of compression, although this almost certainly would have increased the reliability score. The categories in the scoring system in this study were chosen by the subjects on an empirical basis; that is, each of the 30 surgeons used their own training and clinical practice skills to choose the undefined grade for each photograph. If it was important to have a higher reliability in the grading of the degree of compression of the median nerve seen in the operating room, a standardized set of criteria could be established for each category and used to guide the grading. A repeat study, similar to this report, could then be undertaken to re-evaluate the reliability under those circumstances.

Nevertheless, the information gathered from the present study demonstrates that patients can be grouped according to the appearance of the median nerve at the time of surgery. In a study reported by Leblhuber et al (2) that found "no significant correlation between the degree of electrophysiological changes and the degree of median nerve compression" seen in the operating room, the reliability of the four point grading scale used to stage the appearance of the nerve was not defined. It is our intention to repeat Leblhuber's study and to use the degree of compression as tested in our report as a gold standard against which to compare a variety of historic features, physical findings and diagnostic tests.

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