原著

手根管症候群の外科的治療

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Surgical Treatment of Carpal Tunnel Syndrome

by

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In this report, we describe our experience on the treatment of CTS.

Patients and Methods : 187 operations were performed in 45 males (56 operations) and 110 females (131 operations) for CTS during the period from January 1995 to December 2001 in our hospital. The results of surgical treatment were retrospectively reviewed. Before operation, a neurophysiologic examination was performed in all patients. In all patients, standard open release of the carpal tunnel was performed.

Results : The outcome was graded as “excellent” in 169 operations, as “good” in 12 operations and “poor” in 6 operations. Twelve out of 187 were reoperations. Six out of the 12 re-operated patients had received their first operation in other hospitals. These patients all had minimal incision without endoscope for carpal tunnel release. Among 6 re-operated patients who had received the first operation in our hospital, 1 patient had work-related CTS, 2 suffered from hyperuricemia, 2 had incomplete exposure and 1 had a wound hematoma. Twenty patients had bilateral CTS and required two procedures.

In the case of CTS complicated with a basic disease or work-related factors, minimal incision for carpal tunnel release (MICTR) should not be done. In spite of open release of carpal tunnel (OCTR) being performed as the first operation, an incomplete exposure should be reconsidered.

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Key words : carpal tunnel syndrome, open release of carpal tunnel

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Introduction

Carpal tunnel syndrome (CTS) may result from various mechanisms including pressure, stretch, angulation and friction, and there is controversy regarding the therapy for CTS. Besides standard open decompression of the median nerve, its endoscopic release is strongly advocated by some authors¹⁴⁾¹⁵⁾.

Patients and Methods

① Patient's characteristics

In this series, 155 patients (187 operations) consisted of 45 males (56 operations) and 110 females (131 operations) who had undergone a surgical intervention for CTS during the period from January 1995 to December 2001 in our department. The patient's age ranged from 20 to 79 years with the mean of 55.2 years old in males and from 23 to 89 years with the mean of 55.1 years old in females. The

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neurological findings were evaluated on admission, and by a follow-up review. Patient outcome was graded on a scale of excellent, good, or poor: An “excellent” outcome meant complete relief of symptoms and return to full activity; “good” meant normal neurological examinations with minimal complaints such as intermittent numbness with day-time use of the hand; and “poor” meant frequent, night symptoms/or symptoms at rest with limitation of daily activities and/or neurological deficit. Patients were examined at 3–4 weeks after surgery, and over a one-year period, and there was no recurrence and nobody came back to our hospital.

② Diagnosis

After admission and prior to the surgical intervention, a detailed questionnaire was filled out by each patient concerning the presence of pain or numbness, affected site of symptom and work-related issues. Before operation, a neurophysiologic examination was performed in all patients, including both motor and sensory nerve conduction tests and needle electromyographic examination.

③ Indication of surgical intervention

In our hospital, indication for surgical intervention is decided by a neurosurgeon in cooperation with a neurologist. An absolute indication is a failure of medical treatment or clinical evidence of thenar atrophy. A relative indication is the presence of persistent sensory loss. Reoperation is considered in patients who failed to respond to carpal tunnel release or in those with recurrent CTS.

④ Surgical technique

In all patients, a surgical intervention was performed under local anesthesia with sedatives or under intravenous regional anesthesia in an ambulatory unit unless no unusual medical problem was encountered. As for the operative procedure, a longitudinal slightly curved incision averaged 4.0 cm in length was made on the palm with open release of carpal tunnel (OCTR). Under microscopic examination, the transverse carpal ligament was then exposed for division without epineurotomy as a routine procedure. In cases of epineural scarring an epineural neurolysis was performed.

Results

Twelve out of 187 surgeries (12 out of 155 patients) were reoperations. Twenty patients had bilateral surgeries performed during this period. Six out of the 12 re-operated patients had received their first operation elsewhere. Therefore, the true rate of reoperation in our hospital was 3.3% (6/181 operations). The mode of operation in the 6 re-operated patients who had received their first operation in other hospitals was a minimal incision for carpal tunnel release. One patient among them was on hemodialysis, while no basic disease or work-related CTS was observed in the other 5 patients. Among the 6 re-operated patients who had received the first operation in our hospital, 1 patients had work-related CTS, 2 suffered from hyperuricemia, 1 had a wound hematoma and 2 had incomplete exposure. Therefore, pure complication rate in our hospital is 1.6% (3/187 operations) (Fig. 1). In these 3 cases (pure complicative 3 cases), a wound hematoma occurred 2 days after initial operation, and incomplete exposures occurred after 9.5 months and 3 months in each case. Except for the 6 reoperations (6 patients) of which first operation was performed in our hospital (these 6 cases were poor outcome), the outcome was graded as excellent in 169 operations, and as good in 6 operations. Patients were examined at 3–4 weeks after surgery, and over a one-year period, there was no recurrence and nobody came back to our hospital except for reoperations. In this study, there was no untoward injury or infection. The outcomes of the 6 patients who had received the first operation elsewhere were all “good”. And the outcomes of 6 reoperations of which the first operation was performed in our hospital were all “good”, too.

Discussion

Surgical treatment for CTS is usually performed by means of open release of carpal tunnel (OCTR) or a minimal incision for carpal tunnel release (MICTR)³⁾⁷⁾. In MICTR, some procedures are employed such as (1) CTR with endoscopic examination, (2) CTR without endoscopic examination and, (3) minimal double incision for open carpal tunnel release¹⁶⁾¹⁸⁾²¹⁾²³⁾²⁶⁾³¹⁾. In any case of carpal tunnel release, the most important point is the complete release of the flexor retinaculum without damaging the cutaneous,

Fig. 1 Summary of the clinical characteristics

median, or ulnar nerve as well as tendons or vascular structures⁴⁾⁵⁾⁹⁾¹⁰⁾²⁷⁾. With the prevalence of endoscopic surgery in recent years, treatments by less invasive surgery have advanced rapidly¹⁾²⁾⁸⁾¹⁴⁾²⁹⁾³⁰⁾. Although the complication rate of MICTR, if carefully performed by well-trained surgeons, is said to be similar to those of OCTR (1%) based on the literatures, the severity of complication seems to be greater and to be more difficult to recognize.

In practice, 6 out of 12 re-operated patients had first undergone a surgical intervention in other hospitals and all of these surgical treatments had been performed by MICTR (in all 6 cases, a 1.5–2.0 cm incision was made in the midpalm without endoscope)²⁾⁸⁾²⁰⁾. In addition, 1 patient among them was on hemodialysis for which MICTR is generally contraindicated²²⁾. There were 6 patients whose first operation in our hospital failed and required a reoperation. Among them, 1 patient had a work-related CTS and hardly rested even after operation and another 2 patients suffered from severe hyperuricemia⁶⁾¹²⁾¹³⁾. In the case of CTS complicated with a basic disease or work-related factors, MICTR should never be done. In the remaining 3 patients, however, some points remain to be reconsidered. All of the 3 patients had an incomplete exposure or a wound hematoma, and a reoperation could have been avoided if a careful observation had been made at first operation (Fig. 1). When the 2 patients with incomplete exposure were retrospectively reviewed in particular, it seemed that the skin incision at first opera-

tion had been slightly too small. Because the MICTR procedure is performed in a limited visual field, a blind procedure is unavoidable. Since a good visual field is the greatest advantage of OCTR, it should be used wherever possible. There may occasionally be anatomic variations in the median nerve and it is possible to reduce the rate of complication and of reoperation after OCTR by adequate confirmation of exposure during operation²⁵⁾.

There have been many anatomical studies of the carpal tunnel in normal hands. There may be a higher incidence of abnormal anatomy in patients with carpal tunnel syndrome. The superficial palmar arterial arch and digital nerve to the third web lie very close to the distal end of the flexor retinaculum. These structures are hidden by surrounding fatty tissue and cannot be seen through the endoscope or minimal incision, and so there is a risk of laceration of these structures. Iatrogenic nerve or artery laceration due to unpredictable abnormal anatomy is a potential risk in MICTR even when performed by an experienced hand-surgeon¹¹⁾¹⁴⁾¹⁵⁾¹⁷⁾¹⁹⁾²⁴⁾²⁸⁾. Finally, the pure complication rate of 1.6% (3/187 operations) obtained in our patients examined is distinctly lower than values reported previously, though no direct comparison with MICTR could be made because OCTR has been employed in all cases in our institutions. In addition, no significant difference was observed in the postoperative outcomes between MICTR (including endoscopic surgery) and OCTR reported in the literature. Two possible advantages of MICTR are

reduced postoperative discomfort and a shorter period of disability after the MICTR procedure. At present, however, it is very difficult to conclude whether MICTR or OCTR is superior, but we prefer OCTR with a low complication rate regardless of these advantages of MICTR.

Conclusion

1. A retrospective study on CTS treated in the past 7 years in our hospital was reported.

2. In 6 out of 12 reoperations, MICTR was employed in their first operation.

3. Although OCTR was performed as the first operation, 2 cases had incomplete exposure, the evidence of which should be reconsidered.

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要 旨

手根管症候群の外科的治療

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当院における carpal tunnel syndrome (CTS) に対する診断, 治療に関し報告する。

対象・方法: 1995 年 1 月～2001 年 12 月までの間に, 当院で外科的治療を施行された 155 例 (187 件) を対象とした。内訳は男性 45 例 (うち, 手術は 56 件), 女性 110 例 (同 131 件) である。術後評価は retrospective に検討された。術前, 全例とも神経内科により神経学的評価が施された。手術は全例 standard な手根管 open release が施行された。

結果: outcome は, 169 件が excellent, 12 件が good, そして poor が 6 件であった。187 件のうち 12 件は再手術であった。再手術 12 例 (12 件) のうち 6 例 (6 件) は初回手術が他院で行われていた。また, 他院での手術は全例, 内視鏡を用いない minimal incision での手術であった。初回手術が当院であった再手術 6 例 (6 件) 中, 1 例が職業性, 2 例が高尿酸血症, 2 例が開放不十分, 1 例が術後血腫によるものであった。20 例が両側性 CTS であった。なお, 再手術例 12 例の outcome は, いずれも good であった。

結論: 職業性の CTS や基礎疾患を有する CTS に対しては, minimal incision での手根管の開放は適切ではない。また, 初回手術が standard な open release であったにもかかわらず, 不完全な開放で再手術に至ったのは反省すべき点である。

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