

## Results of carpal tunnel decompression operations with minimal incision under regional anesthesia of the wrist

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### ÖZET

#### El bileği bölgesel anestezisi altında minimal insizyon ile karpal tünel sendromu gevşetme operasyonu sonuçları

Bu yayında üç farklı merkezde 2000-2004 yılları arasında açık karpal tünel dekompresyon operasyonu modifiye edilerek klasik el bileği çizgisini geçmeden mini insizyon kullanılarak yapıldığı çalışma serisi sunulmuştur. Tüm vakalarda el bileği bölgesel anestezisi kullanılmıştır. Yaş ortalaması 41 (22-54) olan; 52 hastanın (26 kadın, 6 erkek) 62 adet el bileğine; el bileği bölgesel anestezisi altında ve pnömatik turnike kullanılarak 2-2.5 cm'lik el ayasından yapılan insizyon ile girilmiştir. Direkt görüş altında ligamanın distal kısmı kesilmiştir. Ligamanın proksimal kısmı ve antebrakial fasya derin palmar aponevroz, subkutan yağ dokusundan ayrıldıktan sonra künt bir makas kullanılarak gevşetilmiştir. Karpal tünelin gevşetilmesini takiben katlar kapatılmış ve kompresif bandaj uygulanmıştır. Aynı gün kompresif bandaj çözülmüş; günlük aktivitelere izin verilmiştir. Ameliyat sonrası 16-26 ay (ortalama 21 ay) takiplerinde tekrarlayan şikayetlerinin olmadığı hastaların yöntemden memnun kaldığı tespit edilmiştir. El bileği anestezisi ve minimal insizyon ile karpal tünel gevşetme operasyonları hastanede kalış periyodu kısaltılarak, güvenli şekilde karpal tünel gevşetme olanağı sağlayan hasta konforunu artıran bir yöntemdir.

**Anahtar kelimeler:** Karpal tünel, Median sinir, Minimal insizyon, Bölgesel anestezisi

### SUMMARY

With this paper, we presented our study series on modified open carpal tunnel decompression operation with mini incision, not crossing the wrist line, performed in three centers between 2000-2004. Regional wrist anesthesia was used in all patients. The operation was carried out via a 2-2.5 cm incision made on the palm in 62 wrists of 52 patients (46 females and 6 males), with a mean age of 41 years (22-54 years), under regional wrist anesthesia and using pneumatic tourniquet. Under direct sight, distal portion of the ligament was sectioned. Proximal portion of the ligament and the antebrachial fascia were released by a blunt dissection once they were separated from the palmar aponeurosis and the subcutaneous adipose tissue. Following the decompression of the carpal tunnel, the layers were closed and compression bandage was applied. Compression bandage was removed on the same day and patients were allowed for daily activities. During postoperative follow-up visits (Mean: 21 months, range: 16-26 months) none of the patients reported recurrence of complaints and all were satisfied with the technique. Carpal tunnel decompression with mini incision and wrist anesthesia is a method that provides safe release of the median nerve, shortens hospitalization period and increases patient comfort.

**Key words:** Carpal tunnel, Median nerve, Minimal incision, Regional anesthesia

Carpal tunnel syndrome is the most common compression neuropathy of the upper extremity. Here we presented our series of patients on who classical open carpal tunnel decompression procedure was modified and performed under wrist anesthesia. With this method, we aimed to utilize wrist anesthesia, reduce complications by direct exposure of the carpal ligament and the median nerve

by a small palmar incision, to increase patient comfort and decrease scar tissue.

### MATERIAL and METHOD

Between 2000 and 2004, carpal tunnel decompression with minimal incision and wrist block was performed on 62 wrists of 52 patients. Decision on

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the operation was based on the symptoms of the patients, physical examination and EMG findings. Physical examination included as paraesthesia-numbness in the median nerve distribution, a positive Phalen's flexion test finding and/or a positive Tinel's sign and Durkan's compressive test. Before the procedure, intravenous line was placed in all cases and 10 cc of bupivacaine was injected 4-5 cm proximal to the palmar wrist line, radial to the palmaris longus muscle or on the midline, in the absence of palmaris longus (Figure 1). Before the anesthetic was given, patient was asked to bring his/her fingers to flexion and extension to ensure that the needle was not inserted too deep. If the patient felt pain during the skin incision, local anesthetic was injected along the incision line.



**Figure 1.** Regional wrist anesthesia performed 4-5 cm proximal to the wrist line.



**Figure 2.** Mini incision used during carpal tunnel decompression operation.



**Figure 3.** Total release of the median nerve, seeing the boundaries by the incision.

Using a pneumatic tourniquet, a 2-2.5 cm incision was made on the palm (Figure 2). The incision was deepened, subcutaneous adipose tissue and the palmar aponeurosis was passed to reach the transverse carpal ligament. Proximal part of the ligament and antebrachial fascia were carefully separated from deep palmar aponeurosis, subcutaneous adipose tissue and skin using tonsil tampon or scissors and extended towards the ulnar side by a blunt dissection. Proximal segment of the ligament was sectioned while the median nerve was visible and the wrist was brought to extension. Bringing the wrist to extension enabled the median nerve to be displaced tautly dorsally. Distal segment of the ligament was sectioned under direct vision. At that stage, the superficial palmar arch was identified and safeguarded. Separating the motor branch, the median nerve was released (Figure 3). External neurolysis was performed routinely in patients. In three patients, we thought that proximal segment was not sufficiently released so the median nerve was decompressed proximally by extending incision by crossing the wrist line. The tourniquet was removed once the carpal tunnel was fully decompressed. Following hemostasis, planes were closed anatomically. Following the surgery, patients who used compression bandage were recommended to remove it in two hours and daily activities were allowed after a small dressing. Anesthesia was achieved by Bupivacaine, which delayed postop-

erative pain and, therefore, enabled patients to use their hands for general requirements from day 1. Patients were discharged within the first three hours with elevation of the arm, oral antimicrobials and analgesics to be taken on a PRN basis. Housework and social activities were allowed after the first dressing that was performed between days 3-5. Sutures were removed on postoperative day 15. Massage with vaseline of the scar tissue that caused induration on the palm was performed to alleviate this most common complaint. Patients' complaints were resolved after 2 weeks of massage. No neurovascular complications occurred. All patients were prescribed Vitamin B6 for three months. No problems were encountered with the exceptions of delayed wound healing in two diabetic patients.

## RESULTS

Complaints, especially nocturnal numbness, of the patients improved significantly postoperatively, and during their follow-up for 16-26 months (mean: 21 months), they did not have recurrent complaints, had good functions and were satisfied with the method. Phalen's flexion test finding and Durkan's compressive test found negative in the follow up period. Routine control EMG was not performed in all patients.

## DISCUSSION

In classical method of carpal decompression operations, the incision is made from the palm towards the wrist, crossing the wrist line. Carpal tunnel decompression operation can also be undertaken using a mini-incision, not crossing the wrist line (1,2). With this method, a mini incision can not only expose the transverse carpal ligament and the median nerve but also decreases the scar tissue formation. Only one dressing change is required, without the need for plaster cast, and patients can return to their daily activities in a short time. If the surgeon feels that the proximal segment is not fully released, the incision can be extended proximally.

In three of our patients, the incision had to be extended to cross the wrist line and the median nerve was decompressed proximally.

In an anatomical study by Cobb et al, the authors reported that the central part of the flexor retinaculum extended between 11 mm proximal of the capitate-lunate joint to the 10 mm distal of the 3rd carpometacarpal joint. Thickened antebrachial fascia fuses with the transverse carpal ligament (3). With an incision, these boundaries can easily be visualized and the median nerve can be fully decompressed. External neurolysis was performed to the median nerve and its motor branch in all patients.

In comparison to other regional anesthesia methods (axillary, subclavian, scalene anesthesia, regional intravenous anesthesia, etc), regional wrist anesthesia used for carpal tunnel operations is a safe method that can be performed in a shorter period of time (1,4). Since inability to control motor movements of the arm is not observed postoperatively, as opposed to axillary, subclavian or scalene anesthesia, this technique allows patients to be discharged from the hospital sooner.

Following the decompression of the carpal tunnel tourniquet was loosened and hemostasis was verified. Short-term tourniquet application is usually well-tolerated by the patients. Operation was carried out using epinephrine injection to the site in four patients who could not tolerate the tourniquet. No complication related to epinephrine use was observed. Tzarnas argued that carpal tunnel operations can be performed without tourniquet application when epinephrine is injected in the region (5). Once the patients were prepped and draped, local anesthetic was given and tourniquet was applied.

Endoscopic carpal tunnel decompression (ECTD) operations have gained popularity in recent years. Absence of direct sight during ECTD operations makes this technique more difficult and prone to complications in the hands of an inexperienced surgeon. Incomplete release, neuropraxia of the

digital nerves, median nerve, or the ulnar nerve, transection of the median nerve, pseudo-aneurysm of the superficial palmar arch have been reported in unsuccessful ECTD operations (6-9). It requires an endoscopy system and endoscopic carpal ligament release systems and decompression of the motor branch cannot be accomplished. Motor branch of the median nerve can be decompressed by open method. When necessary, neurolysis can be performed where there is too much pressure. All these factors considered, modified open carpal decompression operation is a good choice as result of being a safe procedure that enables early return to routine activities postoperatively and the ability to extend the incision when necessary. Using a short incision and local anesthesia, this method not only reduces swelling and increases patient comfort but also reduces preparation of the patients for surgery and hospitalization time. The effects of local anesthetic lasts for 6-8 hours during which there would be no pain and, therefore, with a small dressing patient can return to his/her normal activities early. Early induction of rehabilitation is the most important factor in the early return of the patient to daily life (2). Postoperative scar and discomfort is reduced with this technique. Following the removal of the sutures, massage with vaseline will be effective to diminish the induration on the patient's palm and consequent discomfort. Even though endoscopic carpal tunnel decompression looks like an easy technique, open surgery may be preferred considering the potential for, especially,

neurovascular injury associated with endoscopic carpal tunnel decompression. Symptomatic improvement was achieved in all patients. Alleviation of nocturnal pain especially in the first days is an important indicator.

Carpal tunnel decompression with wrist anesthesia and minimal incision is an effective method that allows safe decompression of the carpal tunnel, increases patient comfort and shortens the hospitalization period.

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