

Handmade Traction Wrist Tower

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J Wrist Surg 2018;7:441–444.

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Abstract

Keywords

- ▶ wrist tower
- ▶ wrist arthroscopy
- ▶ distal radius fracture

The article presents handmade traction wrist tower, made from improvised means, which can be an alternative for expensive branded traction devices. The proposed device can be used successfully for wrist joint arthroscopy, as well as for performing various surgical procedures on the wrist and forearm, when traction is needed. This a Level IV study.

Distraction is necessary to improve visualization and provide adequate space during wrist arthroscopy. Traction allows insertion of the scope and instruments for manipulation into the joint. Several distraction options currently exist. Surgeons use either traction systems with beams, blocks, cable and weights, or traction wrist tower.^{1,2} A significant drawback of the *brand* traction devices is their high cost. For example, traction tower (ConMed) costs \$8,720. Therefore, *brand* devices are inaccessible for some hospitals and surgeons.

Handmade Wrist Traction Tower

An alternative to expensive branded traction devices can be a tower for traction of the wrist joint, made from improvised means. The proposed device is assembled from affordable and inexpensive parts of a standard set of Ilizarov apparatus, a standard hand holder from the “Trumpf” orthopaedic table set. In addition, the S-shaped metal hook is prepared to fix the hand holder to the main support. The cuff from the “Gimmi” pneumatic tourniquet is used for contra traction at the humeral level. The cuff grips the patient’s humeral fracture and fixes it to the base of the tower. The handmade foam cushion covered with dermatome is located between humeral and metal basis of the tower.

The base of the tower is made from three arcs with a radius of 120 mm, two plates of 336 mm length, and four threaded rods of 200 mm length. Two telescopic rods with a length of 250 mm are attached to the base of the tower. The arc with a diameter of 140 mm is fixed to the upper part of the telescopic rods (▶ **Fig. 1A**). The cost of all metal details from Ilizarov set is \$256.

Handmade wrist tower is assembled from standard details with aid of two 10 mm spanners. At first, one assembles the base of the tower from three half-arcs and threaded rods. Then two telescopic rods are mounted on the tower base. At the top of the tower, an arc is mounted to which the hand holder will be fixed (▶ **Fig. 1B**).

Clinical Application

Before the surgical procedure, the tower for wrist traction is sterilized in a “Sterrad” machine (Johnson & Johnson) intended for low-temperature sterilization (gas plasma technology) of endoscopes, cameras, light cables, batteries, lenses, probes, microsurgical and general surgery instruments, and many others. Metal parts can be autoclaved partially disassembled. The cuff from the “Gimmi” pneumatic tourniquet and the handmade foam cushion covered with dermatome can be autoclaved too. The sterile device is installed on the side table. The base of the tower is covered by the foam pillow of rectangular shape, which protects soft tissues of arm from contact with metal parts of the tower. The patient’s arm is fixed horizontally to the base of the tower at the level of the cushion using a cuff from the tourniquet set. The fingers at the proximal phalanges level are fixed to the hand holder, which is fixed to the top of the device with the S-shaped metal hook. The forearm is flexed at an angle of 90° and is fixed vertically. Distraction of the wrist joint arm is performed with the help of telescopic rods, which are distracted by approximately 5 to 6 cm. The rods are locked in this position with nuts and bolts. Some branded traction devices (“Arthrex,” “ConMed,” “Smith & Nephew”) do not provide the possibility of elbow joint extension with

received
September 4, 2017
accepted
March 29, 2018
published online
May 7, 2018

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Tel: +1(212) 584-4662.

DOI <https://doi.org/10.1055/s-0038-1649504>.
ISSN 2163-3916.



Fig. 1 (A) Handmade traction wrist tower. (B) Wrist tower partially disassembled, hand holder from the “Trumpf” orthopaedic table set, the S-shaped metal hook, the cuff from the “Gimmi” pneumatic tourniquet, and the handmade foam cushion covered with dermatome.

simultaneous wrist joint traction. The proposed device also does not have this property. It should be recognized that only the firm wrist tower “Acumed” has such a property.

In certain procedures passive rotation of the forearm is crucial. Diameter of the hook is smaller than the diameter of the hole in the arc on the top of the tower. This circumstance makes it possible to rotate the forearm—approximately 45° in one direction (supination) and 45° in the other (pronation).

The proposed device can be modified if needed. Chinese finger traps can be used instead of a hand holder from the “Trumpf” orthopaedic table set. By changing the hole in the arc on the top of the tower, the traction axial distraction force can be directed to the radial side or ulnar side of the wrist. Besides this, the device can be used for thumb CMC arthroscopy (traction on the thumb only). The metal details of the tower may interfere with X-ray examination during surgical procedure. To eliminate this disadvantage, some metal details can be replaced with details from X-ray negative material (e.g., using of carbon fiber ring instead of metal ring).

Our Clinical Series

The proposed device was used for the diagnostic arthroscopy for nine patients aged 16 to 63 years with different wrist joint pathology: SNAC wrist (3), SLAC wrist (1), Kienbock’s disease (3), and rheumatoid arthritis (2). The wrist joint arthroscopy was performed using typical ports (► Fig. 2A). Arthroscopic evaluation of the joint condition helped to choose the optimal surgical procedure. No specific complications connected to use of the handmade wrist tower were revealed.

The proposed device can be successfully used not only for arthroscopy of the wrist joint but also for performing various

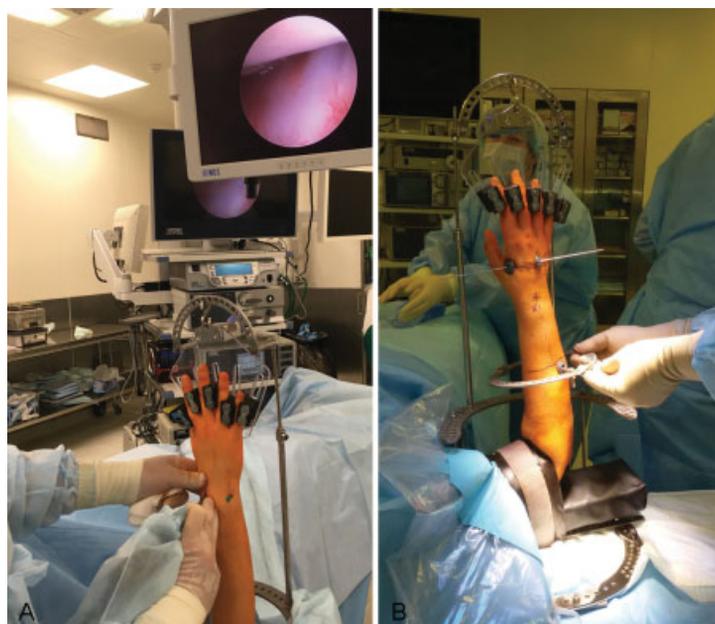


Fig. 2 (A) Diagnostic wrist joint arthroscopy using of the handmade traction tower. (B) Assembling of the external fixator using of the handmade traction tower for the treatment of the distal radius fracture.

surgical procedures on the wrist and forearm when traction is needed (e.g., assembling of the external fixator for the treatment of the distal radius fracture) (→ **Fig. 2B**). The traction tower can be assembled without difficulty from accessible and inexpensive materials. The handmade wrist tower can be used many times.

Thus, the presented handmade traction wrist tower can be used as an adequate alternative for expensive branded traction devices.

Conflict of Interest

None.

References

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