

# PRELIMINARY RESULTS IN A ONE YEAR COMPARISON OF THE CLINICAL OUTCOME IN CARPAL TUNNEL SYNDROME TREATMENT WITH PERINEURAL MEDIAN NERVE ULTRASOUND-GUIDED INJECTIONS OF 5% DEXTROSE AND CORTICOSTEROIDS

Vesna Potočnik Tumpaj<sup>1</sup> MD; Gregor Omejec<sup>2</sup> PhD, Žiga Snoj<sup>3</sup>, MD, PhD,

<sup>1</sup> Department of diagnostic and interventional radiology, General hospital Slovenj Gradec, Slovenia, <sup>2</sup>Institute of Clinical Neurophysiology, Division of Neurology, University Medical Center Ljubljana, Ljubljana, Slovenia,

<sup>3</sup> Institute of Radiology, University Medical Centre Ljubljana, Slovenia,

## BACKGROUND

Carpal tunnel syndrome (CTS) represents one of the most common entrapment neuropathies and can, in fact, be considered a socio-economic issue that reduces work productivity, increases disability, and requires prolonged rehabilitation. The diagnostic workup includes a comprehensive evaluation including clinical findings, nerve conduction studies, and ultrasound imaging (US), which represents the modality of choice due to the superficial course of the median nerve (MN). Therapeutic recommendations for CTS depend on disease severity and may include anything from a conservative approach to surgical intervention. Lately, ultrasound-guided injections into the carpal tunnel, have become increasingly important in the treatment of mild to moderate CTS. But in the literature, there is no consensus on the protocol for US-guided injection treatment of CTS. Many different solutions were proposed for the injection treatment, the most successful being corticosteroids, and 5% dextrose. The purpose of this study was to select the solution with a better clinical outcome from the two previously mentioned.

## PURPOSE

The purpose of this study was to assess a one-year clinical outcome of US-guided injections of 5% dextrose and corticosteroids. The hypothesis we wanted to verify was that 5% dextrose produced better clinical outcomes compared to corticosteroids in the treatment of CTS with US-guided injections.

## METHODS

A pilot, prospective, randomized double-blinded study was conducted at the University clinical center of Ljubljana, Slovenia in which we included 20 participants with diagnosed bilateral CTS. All patients were given a consent form to sign upon enrollment in the study and were given a full diagnostic work-up (clinical examination, questionnaires (VAS – visual analogue scale and BCTQ – boston carpal tunnel questionnaire), electrophysiological (EMG) and US measurements) for CTS for the evaluation of the severity of CTS. Only patients with mild to moderate CTS were included. Before the procedure, we randomly selected the solution for the participants' left wrist (6ml of 5% dextrose in water) or 2ml of corticosteroid (80mg of triamcinolone) mixed with 4ml of saline. The remaining solution was administered to the right wrist. The procedure was performed by a radiologist. The patient was seated across from the radiologist and both hands were sterile prepped. Under the guidance of the US, a 22G needle was inserted perineural to the MN at the level of the carpal tunnel inlet, and with the technique of hydrodissection, one of the solutions was injected. Afterward, a follow-up was conducted at 1, 3, 6, and 12 months after the procedure where BCTQ, VAS, EMG and US measurements were taken again. The primary outcome was the success of the procedure which was defined as a 1,3 point reduction on the VAS scale and 8 point reduction in the BCTQ questionnaire.

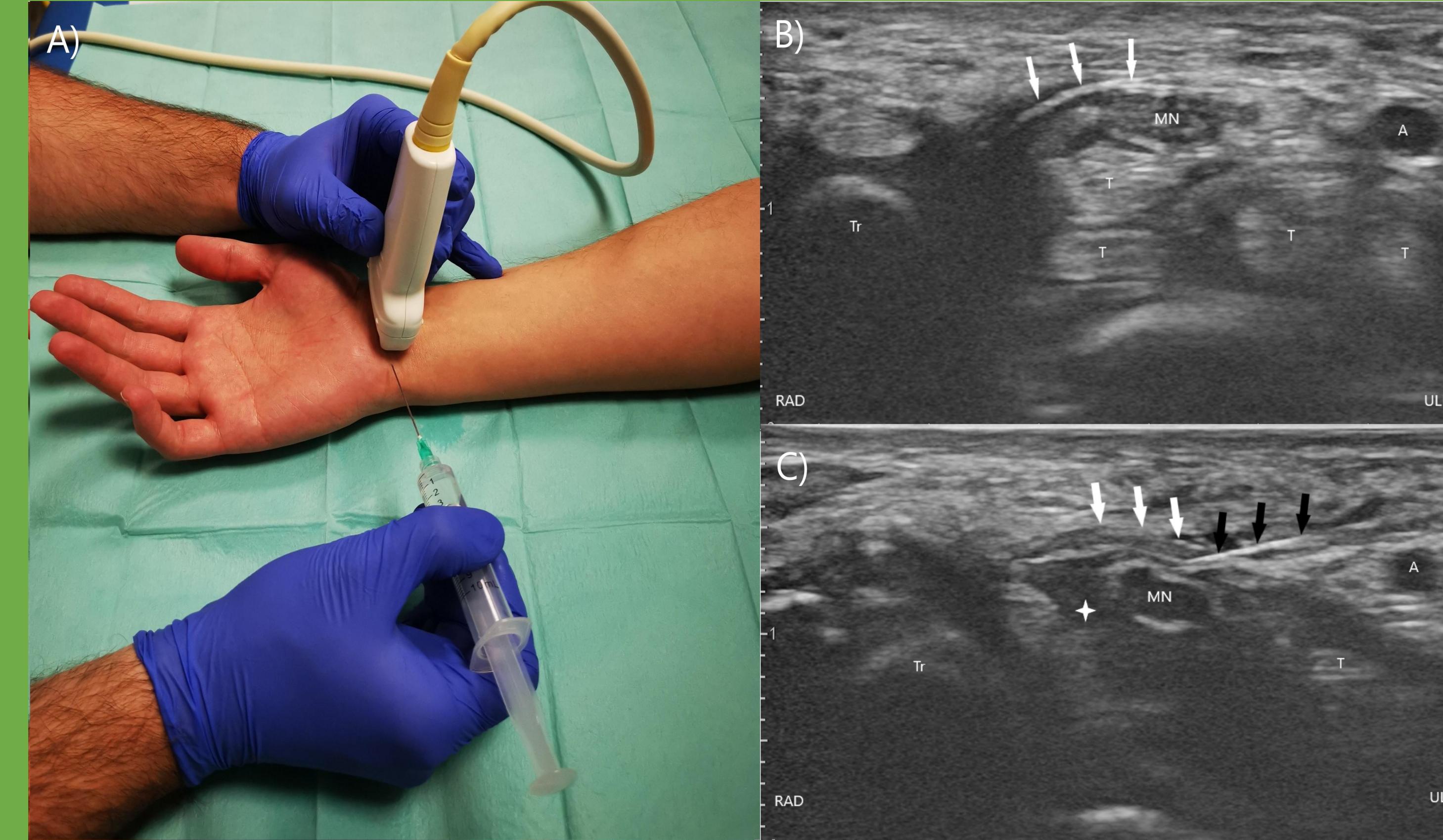


FIGURE 1. A, B, and C showing the ulnar approach. A; wrist and needle positioning for carpal tunnel injection, B; ultrasound anatomy of the carpal tunnel shown in the short axis, C; penetrating transverse carpal ligament positioning the needle tip above the median nerve Ultrasound of the carpal tunnel after the needle penetrates the transverse carpal ligament. Comparing B and C note the expansion of the perineural space marked with a white cross. (ULN - ulnar, RAD - radial, A - ulnar artery, MN – median nerve, Tr - trapezium, T – flexor tendons, white star – ulnar nerve, white arrows – transverse carpal ligament, black arrows – needle, white cross – perineural injectate); From: Ultrasound-guided carpal tunnel injections. By Tumpaj T, Potocnik Tumpaj V, Albano D, Snoj Z. Radiol Oncol. 2022; 11; 56: 14-22. doi: 10.2478/raon-2022-0004.

## RESULTS

All 20 of the participants concluded the study. The study included 18 ( 90%) females and 2 (10%) males between the ages of 42 – 79 years (mean age  $52 \pm 10,09$ ). Both solutions demonstrated an improvement of the clinical outcome in VAS ( $p < 0,05$  in each follow-up) and BCTQ score ( $p < 0,05$  in each follow-up) in the treatment of CTS with US – guided injections after one year compared to the baseline. Also there was no statistically significant difference between 5% dextrose and corticosteroids in comparing the clinical outcome with VAS ( $p = 0,432$ ) and BCTQ score ( $p = 0,286$ ).

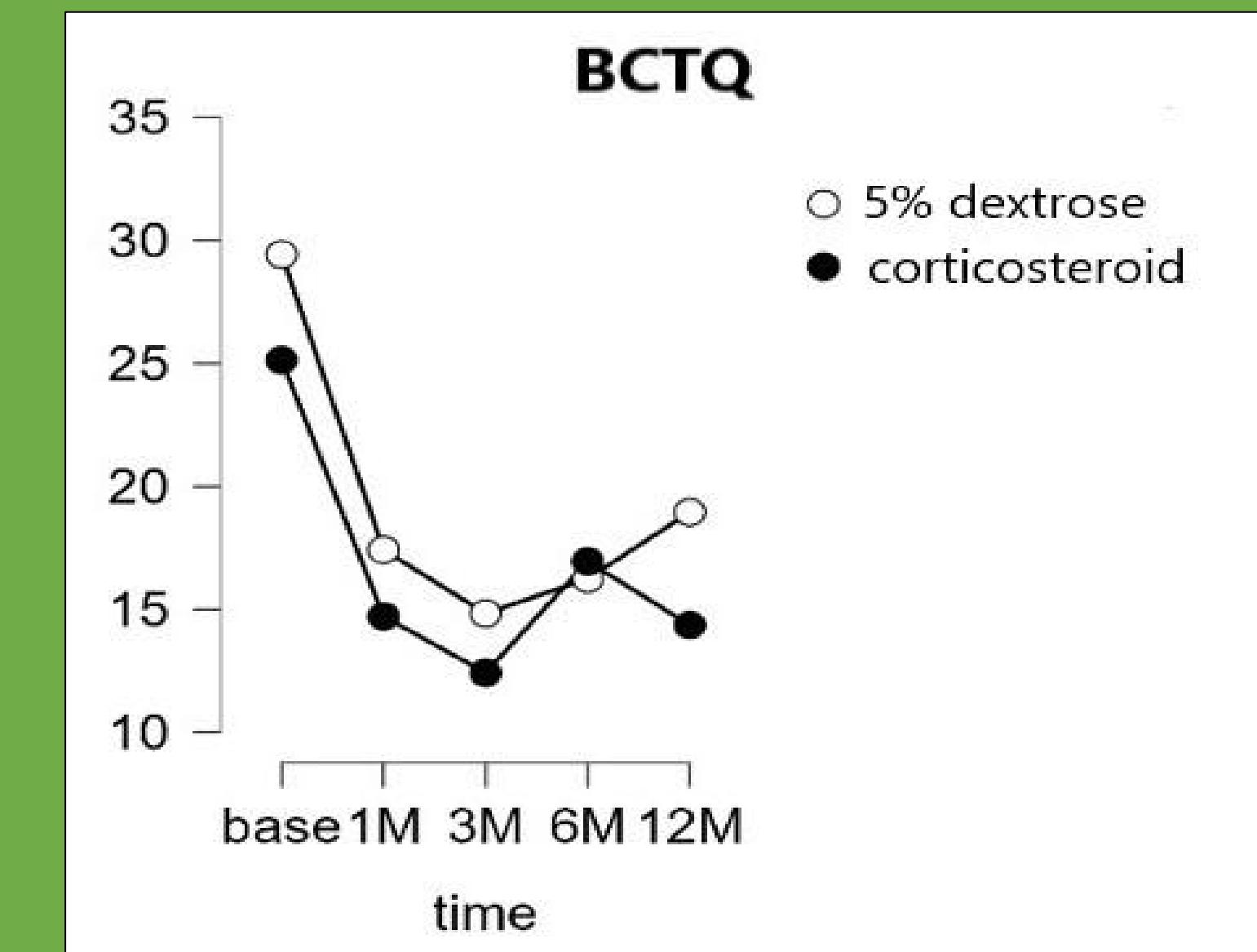
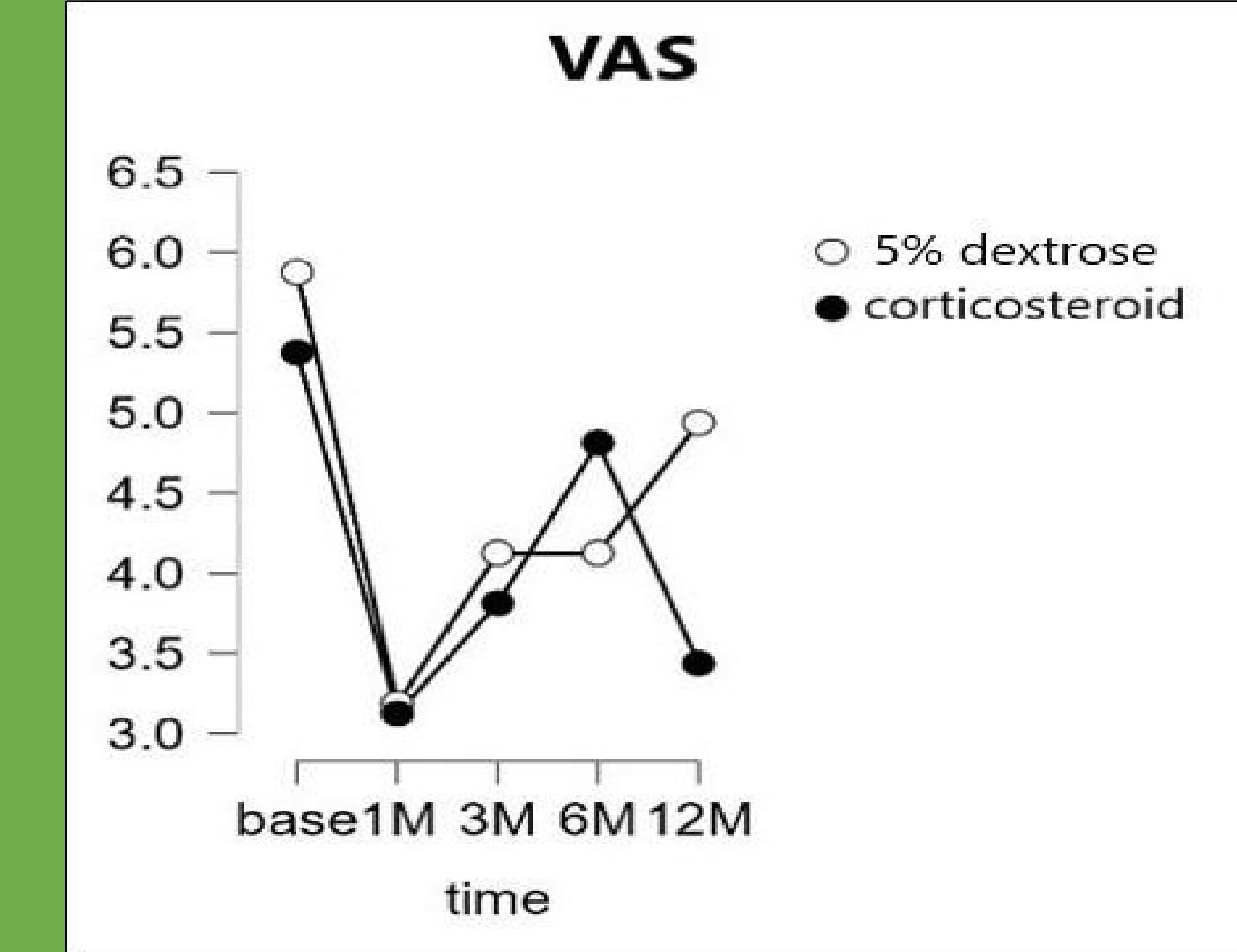


FIGURE 2: graphs of the clinical outcome (VAS – visual analogue scale and BCTQ score) of US-guided injections of 5% dextrose and corticosteroids for the treatment of CTS; before treatment and at 1, 3, 6 and 12 months of follow-up.

## Conclusion

Our pilot study confirmed that the clinical outcome of US-guided injections of 5% dextrose after one-year is comparable to injections of corticosteroids for the treatment of CTS. We confirmed that both solutions (5% dextrose and corticosteroids) are effective in US – guided injection treatment of CTS.