Arthroscopic treatment of scaphoid nonunion, preliminary results

Robert Gvozdenovic MD
Herlev/Gentofte Hospital, University of Copenhagen
Orthopaedic Surgery Department
Hand Surgery Unit
Hellerup, Copenhagen, Denmark

Objective
Scaphoid waist- or proximal pole fractures have been related to high rates of late- or nonunion after conservative treatment. Various treatment options including vascular- or non-vascular grafting by the open- or the percutaneous techniques has been proposed as method of choice to treat these conditions, resulting in good healing, though, needing long healing-time and compromising the function of the injured wrist. Few studies enlightened the union rate and the exact healing progress of the arthroscopic/arthroscopically assisted procedures in the scaphoid nonunion treatment. Our pilot-study shows the results of the arthroscopically assisted, scaphoid nonunion treatment.

Methods
From December 2015 to December 2017, 9 consecutive patients have been treated for the scaphoid nonunion, arthroscopically, with a local bone grafting from the distal radius. Mean time from the injury to the operative treatment has been 27 months (range 3months – 15 years). All the patients were men, with the mean age of 22 years (range 17 – 32). 7 patients received no treatment to their condition. Only 1 patient received conservative treatment with an immobilization time of 6 weeks prior to the surgery. All patients were investigated with the CT scan in order to distinguish any hump-back deformity of the scaphoid bone which was exclusion criteria. The Mini Acutract headless compression screw system of Acumed, (Hillsboro, Oregon, USA) has been used in all cases.

All the patients were immobilized with a thumb/wrist splint, after the arthroscopic treatment for 2 weeks, allowing the hand therapy with none weight-bearing exercises begin. The removable splint was used for the four further weeks where x-ray investigation showed the level of union. Full weight-bearing activity was allowed after the bony union was determined by the X-ray follow-up studies. Mean follow-up was 7 months (range 3- 12 months). The evaluation included assessment of pain (VAS score), union time, range of motion (ROM), grip strength and Disabilities of the Arm, Shoulder and Hand (quick-DASH) Score.

Results
No complications during surgery or postoperative treatment has been discovered. All patients but one achieved full bony healing at the 5 – 18 weeks (mean at 7,8 weeks) follow-up established by the X-ray investigation and the clinical examination. Postoperative CT scan were performed only in cases where radiographs did not showed progressive healing in order to avoid unnecessary exposure to radiation. All patients achieved improvement in the measured values at the evaluation as well as full satisfaction of their treatment at the follow-up. Pain, ROM, grip-strength and quick-DASH showed statistical significance (p<0.05) as shown on the table on the right.

Discussion
Arthroscopic treatment has been winning in recently as a minimal invasive technique, not interruptive to the patient’s blood supply and proprioception, thus giving possibility for faster recovery. Arthroscopically assisted surgery have been recently advocated for stable scaphoid nonunion without hump-back deformity, regardless the location of the nonunion, presence of cystic formations or nonunion interface <10 mm.

In our preliminary series, in one case the healing has been established on <50% of the healing surface (CT scan verified), at the 12 weeks follow-up. This delay might be caused by heavy cigarette-smoking habits of the patient.

Conclusions
Our pilot-study showed that arthroscopically assisted compression screw fixation and bone-grafting of established scaphoid nonunion yielded fast healing and recovery.

A larger, comparative study between different treatment methods is desirable.

Operative technique for arthroscopically assisted scaphoid nonunion treatment. Removal of the cystic tissue, bone-graft harvesting from the radius, grafting procedure and cannulated compression screw fixation, applied over the K-wire used as a guide are some of the important details.

(Figures of different phases of the surgery are shown in the clockwise direction).

<table>
<thead>
<tr>
<th>VAS rest/activity (1-100)</th>
<th>Pre-op</th>
<th>Post-op</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grip strength (Kg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>qDASH</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18-year old man with 4 months old, left scaphoid nonunion of the proximal pole. Status 4 months follow-up: the patient was able to perform full weight-bearing push-ups. Bony healing was achieved at 5 weeks after the surgery.

References:
2. Dua FI, Driehart J. Arthroscopy 2011; 27:16-27