The value of conservative treatment versus surgery of non-displaced waist scaphoid fractures

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Abstract

Introduction
Scaphoid fractures are the most common type of hand fracture. Traditionally, non-displaced fractures of the scaphoid have been treated conservatively, with the immobilisation of the hand with a cast; hence, surgical fixation of the fracture has become increasingly popular because of quicker re-mobilisation and return to its original function. However, this was balanced against the risk of complications of surgery of the fractures. This review article has found that there is no statistically significant benefit obtained, with both treatment methods showing equally good outcomes at the final follow-up. The aim of this review was to discuss the treatment of scaphoid fractures comparing the effectiveness of conservative treatment, with surgical intervention in non-displaced waist fractures of the scaphoid bone.

Materials and methods
Electronic databases, including MEDLINE, PubMed and the Cochrane Library, were searched with the keywords of ‘scaphoid fracture’, ‘waist’, ‘conservative’ and ‘surgery’. A total of 12 articles were selected for this review.

Results
A total of 158 articles were found during the search from the electronic databases for this review study. The numbers of articles were reduced, because of the specificity of the review article. The articles were evaluated to determine if they fulfilled the inclusion criteria to be part of this review article. The articles that included only non-displaced waist scaphoid fractures were included in this review of surgical treatment.

Conclusion
Both conservative and surgical treatments are used to treat non-displaced wrist fractures of the scaphoid. Studies have shown that there are no long-term benefits of this surgery compared to conservative management. However, this surgery has a transient benefit in terms of range of motion, grip strength, but at a final follow-up, both the treatment groups showed no statistical significant differences in terms of the outcome. One may prefer surgery because of the overall reduced cost, as well as an earlier return to work and mobility. However, this must be balanced by the risk of the surgical complications involved.

Introduction
The scaphoid bone is the most common type of fractured carpal bone. In the United States, fractures of the bone accounts for approximately 10% of the hand fractures, with an estimated incidence of 29 per 100,000 persons. Herbert A2 fractures (non-displaced unicortical waist fractures) account for 16.5% of all the scaphoid fractures¹. The conventional method of treatment for the non-displaced waist fractures is the immobilisation of the wrist with a cast for 8–12 weeks. However, the use of surgical intervention in the treatment has become increasingly popular because of the quicker recovery period. This review paper examines that which of the two treatment methods has a better outcome for the patient in terms of cost, complication risks, function, non-union rates and patient satisfaction.

Materials and methods
Electronic databases, including PubMed, MEDLINE and Cochrane Library, were used in the collection of articles. The keywords used in this search included ‘scaphoid fracture’, ‘waist’, ‘conservative’ and ‘surgery’. Epidemiology, pathophysiology, clinical manifestations, diagnosis and treatment were examined in this review. In addition, bibliographies of the articles that were reviewed have been screened for additional relevant articles not discovered in the electronic search.

Results
The usual mechanism of injury for a scaphoid fracture is due to a fall on an outstretched hand (FOOSH)². The sources of scaphoid injuries include the falls, athletic injuries or motor vehicle accidents¹. FOOSH leads to an over exaggerated dorsiflexion of the wrist, causing the scaphoid bone to impact against the dorsal rim of the radius hand.

Patients with a scaphoid fracture present often with wrist pain, which may be misdiagnosed as just a wrist sprain. Pain and tenderness on the radial side of the wrist is common and exacerbated with wrist motion. Other presentations include tenderness over the distal scaphoid tubercle, pain with longitudinal compression of the thumb, as well as limited range of motion.

Treatment
Surgery
Surgical intervention involves either percutaneous pin fixation or open...
reduction and internal fixation (ORIF) of the bone using smooth Kirschner wires or Herbert screws. Both volar and dorsal approaches are used with the direction of screw insertion (retrograde or antegrade), often dependent on the surgeon’s preference. Post-operatively, splint immobilisation or a bulky bandage, covering the wound site follows the surgery. These post-operative steps of care are often limited to 1 or 2 weeks after surgery, with encouragement for the patient to move the wrist and hand to prevent stiffness. This surgery has traditionally been reserved for displaced fractures, although it is now increasingly being used for patients, who are unwilling to be subjected to prolonged casting.

Conservative
Conservative treatment involves the immobilisation of the hand, with a below, elbow scaphoid cast, for a period of 8–12 weeks, most commonly for non-displaced fractures. This immobilisation of the hand can either be in wrist flexion or extension. The duration of casting may be longer if radiographic evidence shows that the fracture has yet to fused. Scaphoid fractures are often hard to immobilise, as almost every motion of the hand, wrist and forearm causes movement of the bone, putting pressure on the fracture line. If radiographically, there is an evidence of a widening fracture or a failure of unionisation following conservative treatment, patients may be referred back for surgical evaluation and possibly for a surgery also. Different types of casts may be used, including those that are above or below the elbow. Casting may include the thumb (‘scaphoid fracture’) or no thumb (‘Colles’ fracture’). After immobilisation is completed, the patients are encouraged to perform active range of movement exercises to the forearm, wrist and thumb to prevent stiffness. Hand-therapy sessions with physiotherapists should also be prescribed.

Discussion
Immobilisation of the wrist using a plaster cast is a very safe treatment for non-displaced scaphoid fractures. Between 90%–95% of fractures will heal following treatment with a cast. However, patients must be able to accept the long length of immobilisation for 8–12 weeks in conservative treatment. Few studies have been published on the consequences of prolonged immobilisation. One significant drawback of casting is the stiffness of joints, particularly of the wrist following weeks of immobilisation and thus, requiring prolonged rehabilitation to return pre-injury levels. Prolonged immobilisation can also lead to muscle wasting. However, a study has shown that fractures are very likely to heal, if given sufficient time for immobilisation. Although surgery does not require prolonged casting, it will still require protection of the wound site, with bandages for 4–6 weeks. However, during this time, the patient is encouraged to mobilise the wrist to prevent stiffness.

There has been no conclusive evidence that shows which type of cast provides the best conservative outcome. There are no indications showing that a scaphoid or above, elbow cast produces a better outcome than a Colles’ fracture cast. The position of immobilisation, whether in slight extension or flexion has not produced a clinically relevant difference in range of movement at six months post-injury.

In terms of cost-effectiveness, two studies have shown that surgical intervention is more cost-effective. Although the initial cost of surgery may be higher, the overall cost is higher in the conservative group, because of compensation from time-off work and compensation for the injury, an indirect cost from the injury. Furthermore, one study showed that manual workers or blue-collar workers were more likely to take longer sick leaves because of the nature of the injury causing a greater impact on their occupations. The total direct cost, inclusive of surgery, radiology, medical visits and physical therapy, were higher in the surgical group, but the cost for medical visits were nearly ten times higher in the non-surgical group compared to that of the surgery.

Surgical treatment has been shown to quicken a patient’s time to return to work, sports and other physical activity in comparison to conservative treatment. This is not only because of the immobilisation for 8–12 weeks for cast treatment, but studies have shown that surgical treatment has a better outcome in short term, when considering range of motion of the wrist, pain and grip strength. However, these advantages were only transient and by the final follow-up there was no statistically significant difference in these parameters between the two treatment groups. However, one study showed that the injury would not return these parameters to baseline, in either of the treatment groups.

Complications of the post-surgery include superficial wound infections, hypoesthesia in the region of the palmar cutaneous branch of median nerve and mild early algodystrophy. These complications were relatively rare, accounting for less than 2% of such cases. Of more concern was the scarring of the wound site, with the scar being sensitive or hypertrophic, accounting for approximately 7% of the cases. These complications relating to the scar could be reduced if percutaneous fixation was used instead of ORIF. More serious complications involved the screws used in fixing the bone. Intra-operative issues include misplacement of the screw or the drill, which were rectified during surgery. Other issues involved the scaphoid tuberosity splitting during screw insertion. Complication rates may be reduced.
if an experienced surgeon performed the surgery.

An important consideration is the risk of non-union after the treat-
ment. It has been reported that surgical treatment with screw fixa-
tion can achieve a union rate close to 100%14,19. The main
determinant of whether the bone has healed is a
radiographic evidence of a union. In
one of the studies5, 9% of a surgically
treated group showed delayed union
compared to 5% surgically treated
patients, who had an internal screw fixation,
was 43 days compared to 74 days for
those patients, who had a cast. This
was also evident in another study19,
which also showed that union by
surgical treatment was quicker than
conservative treatment. Nonethe-
less, two studies15,21, whose final
follow-up was 10 years and 12 years,
respectively showed that all patients
in both the groups showed full union
radiographically at the time of this
final follow-up.

Those patients, who want a
 quicker recovery time, with an earlier
hand function return, may choose
surgery over casting. In particular,
the patient's occupation may be an
important consideration as to which
of the two treatments is chosen. Athletes or blue-collar workers
are more likely to choose surgery,
because of the shorter time-off and
earlier mobilisation. One may choose
conservative treatment, if the injury
occurred in the non-dominant hand.
Post-operative strength was better
in surgical patients within one year
of surgery, but after that, no difference
was observed when compared to
casting4,11.

There are several limitations in
this review article. Firstly, the sample
size in the articles reviewed were
not relatively large, with the largest
having only 88 patients. Further-
more, some of the studies had a larger
inclusion criterion than stated in this
review article, as some included in
the studies were acute scaphoid
non-displaced fractures, which did
not state specifically a waist frac-
ture. Only two studies, which stated
explicitly having only non-displaced
waist fractures were included17,19.
Furthermore, the final follow-up
time varied between the different
studies, ranging from 6 months
to 12 years. Also, the studies used
were not uniform and ranged from
random controlled trials, retropec-
til studies to meta-analysis studies.

Conclusion

Treatments for scaphoid fracture
have traditionally been conservative,
with surgical intervention reserved
for displaced fractures. The majority
of studies have shown that there is
no statistically significant evidence
to show that one method is superior
to the other. Surgery in the hands of
an experienced surgeon will have
an equally good outcome when
compared to non-surgical treat-
ment, with union rates and patient
satisfaction being the same at the
final follow-up. Ultimately, it is up
to the patient in consultation with the
treating clinician that determines the
mode of the treatment.

Abbreviations list

FOOSH, fall on an outstretched hand;
ORIF, open reduction and internal
fixation.

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Review


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