

The Story of the Displaced Midshaft Clavicle Fracture:

*Does the story have a moral?
Should we begin with the moral?*

LARRY HALPERIN, M.D.

August 3, 2019



Clavicle Fractures are very common

Most common fracture in kids

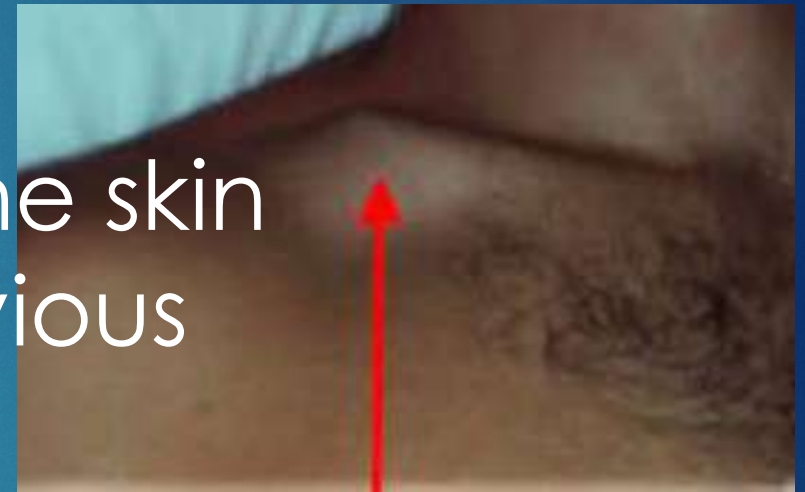
1 of every 20 fractures

44% of all shoulder girdle injuries



HISTORY

-The clavicle is right under the skin
displacement can be obvious

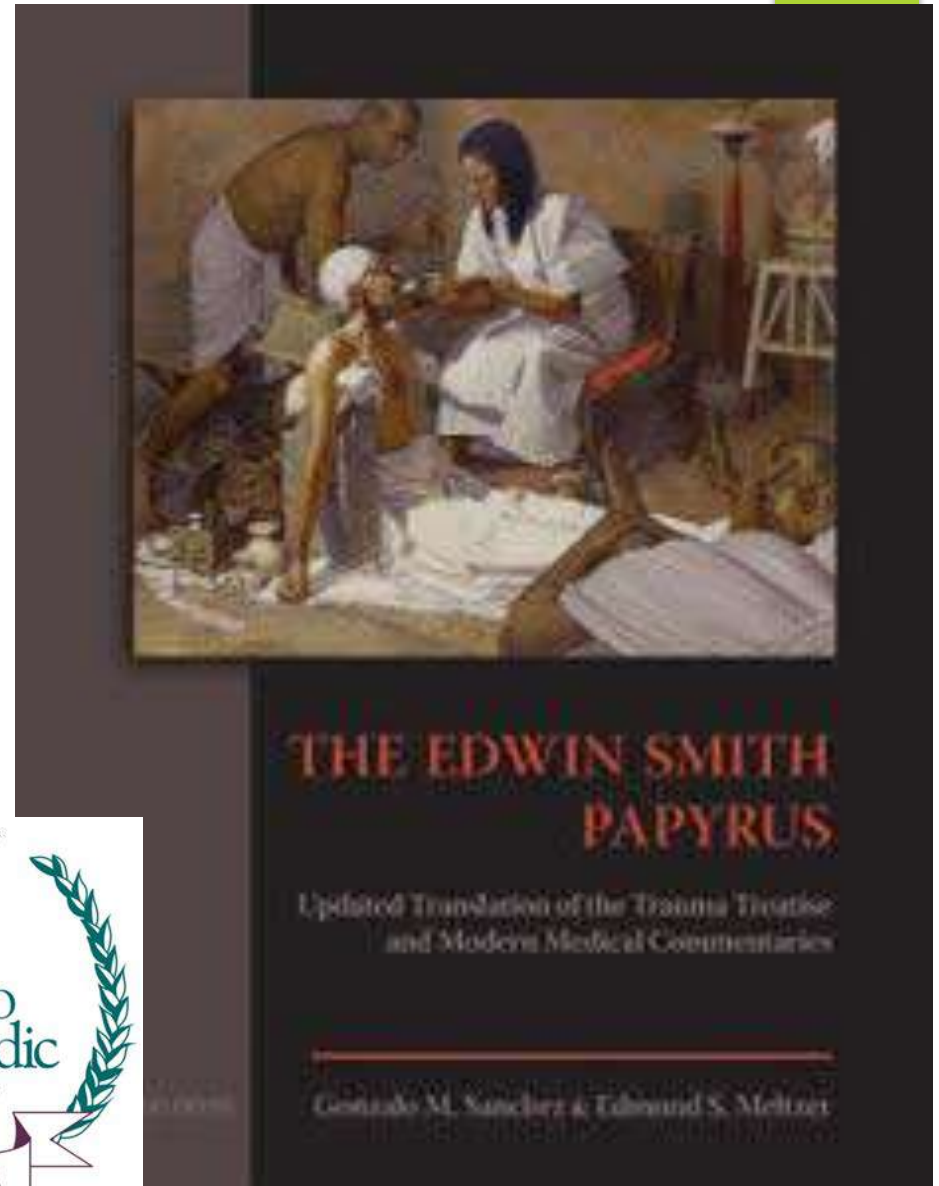


-Mentioned in ancient descriptions of the
skeleton.....



'Edwin Smith Egyptian Papyrus' 3000B.C.

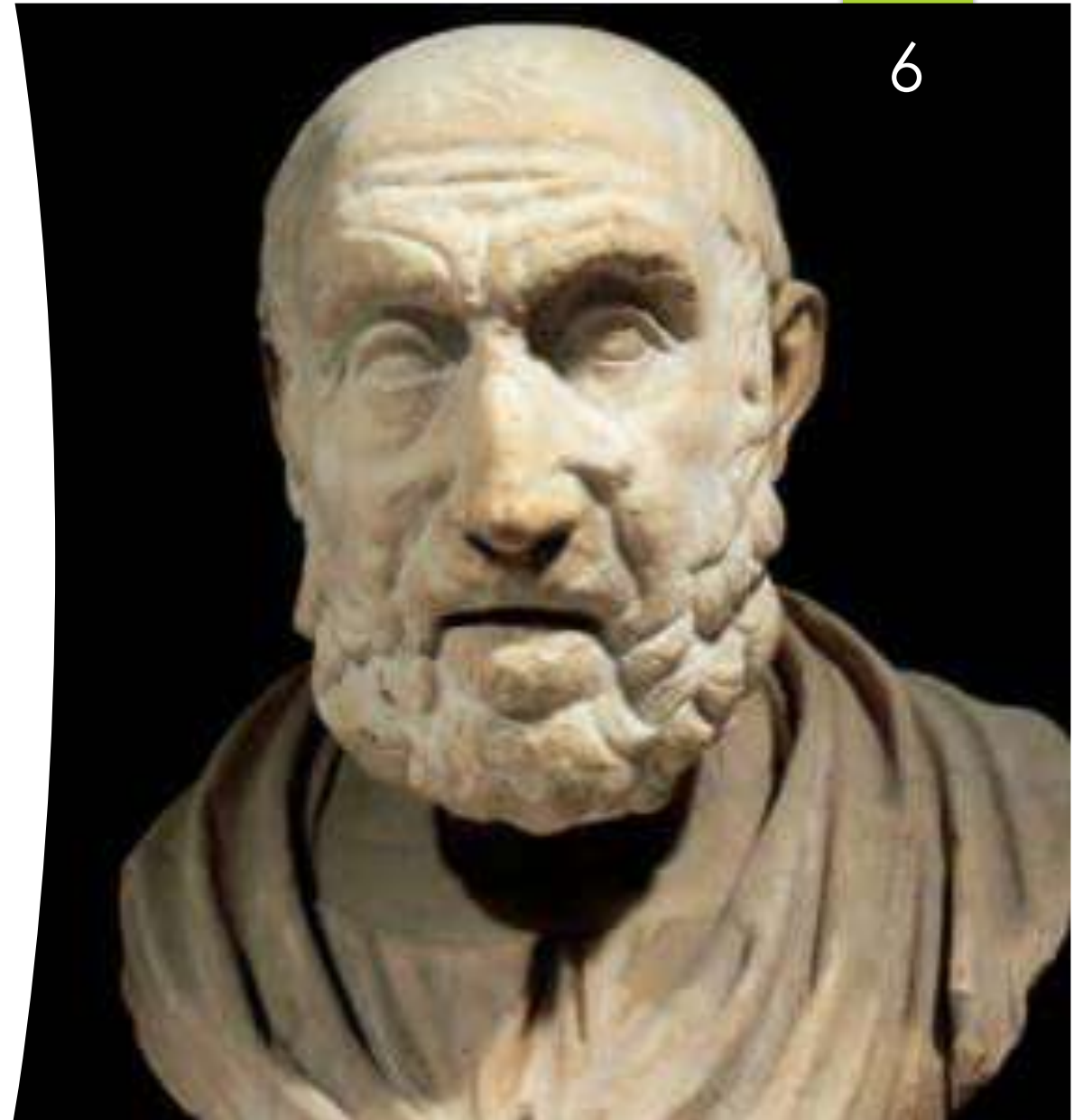
recommendations
for treating
clavicle fractures



Hippocrates 400 B.C.

“Union usually occurs rapidly...despite the deformity, healing generally proceeds uneventfully”

Hippocrates
was right!!



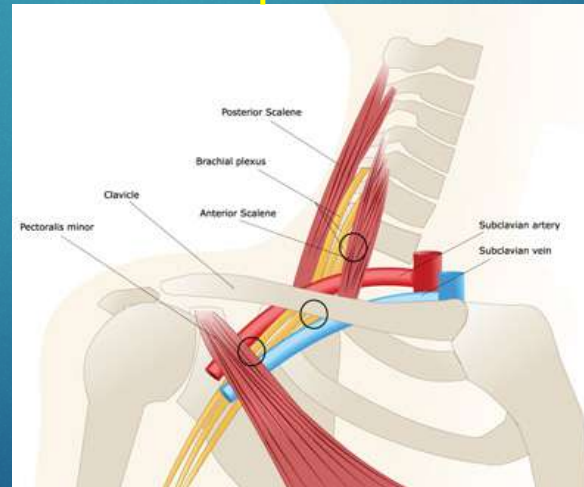
HISTORY

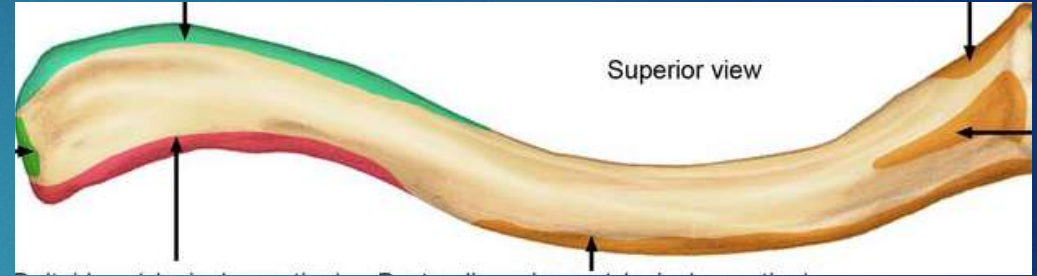
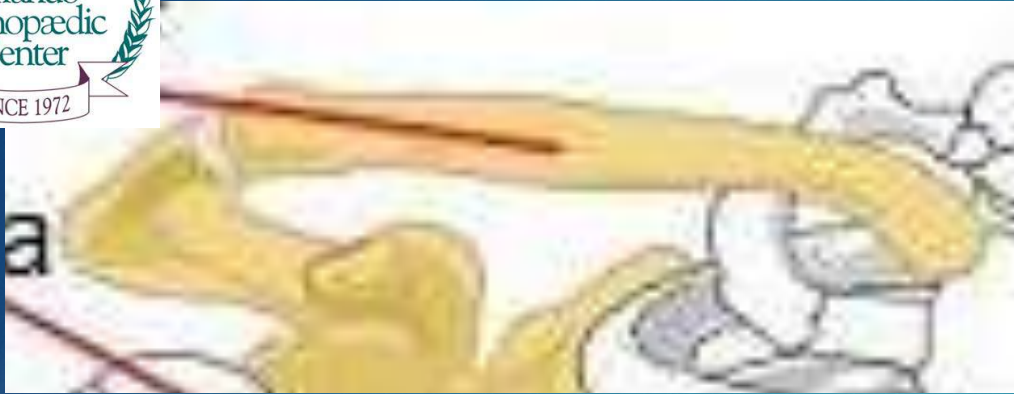


William III- died after being thrown from his horse and fracturing his clavicle (1752)



Sir Robert Peel (1850) fell from his horse on the way to Parliament...developed a false venous aneurysm





Evolutionary Story

Flyers and Climbers have clavicles
Swimmers, runners, and grazers do not.



climber



grazer



Clavicle may not be very important in most modern humans



Early Treatments were aimed at reducing the fracture



But they did not work- the bone kept going back to being out of place



And that was recognized long ago.

“

...for a century and a half we see the most celebrated surgeons striving to prefer... contrivances for treating (the) fractured clavicle...(The treatments) are extolled as producing cures without deformity...but subsequent experience has falsified these promises...I have never seen such an instance.”

Malgaigne 1859



Do fractures even need to be treated?



I was taught?

.....most of these fractures unite uneventfully...many have residual deformity...yet interference with function, cosmesis, activity level, & satisfaction appears to be minimal

Fractures in Adults

Rockwood and Green 4th Edition 1996



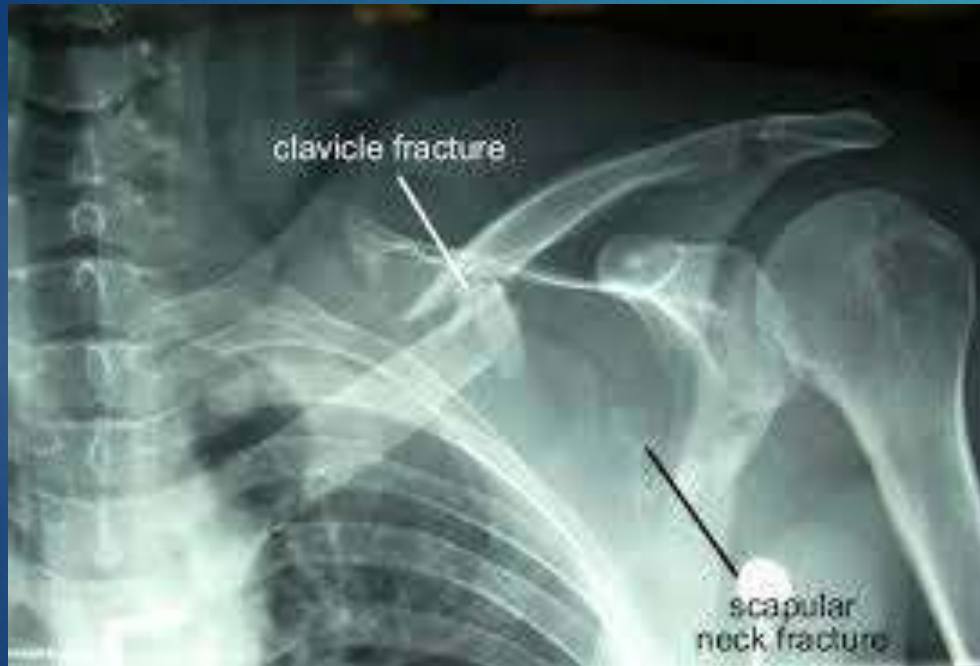
I was taught to?

Put them in a sling and let the bone heal.
You can't reduce the fracture- so don't try.
These patients do fine and do not need surgery.



Do fractures even need to be treated?

Not discussing the floating shoulder-



Or the open fracture

Or when the bone may pop through the skin

Shall we reduce the fracture?

Over 200 methods have been described.



What else did Rockwood and Green tell us?

“An extensive search of the literature would lead one to conclude that immobilization is nearly impossible to achieve, that deformity and shortening are usual, and that even if some shortening occurs, it generally does not interfere with function.”

Rockwood and Green, 1996



Do we really need to operate?



5 Weeks



Do we really need to operate?



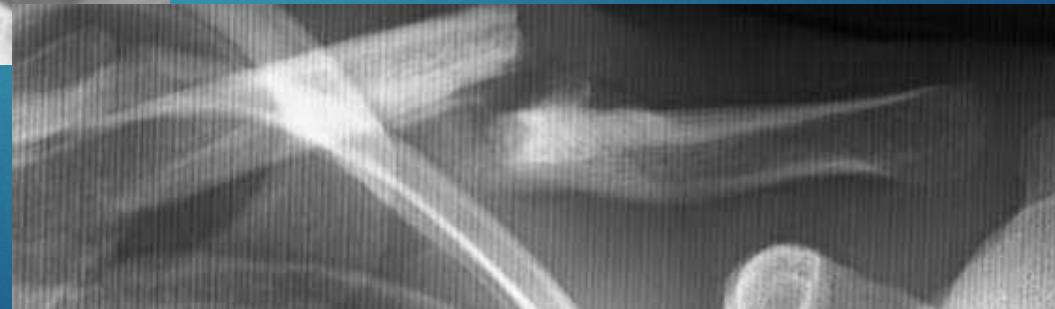
2 months



Do we really need to operate?



4
weeks



7
weeks



Do we really need to operate?

(same case)



No Pain
Full Motion

If we don't have to
operate...
Why do we?



Especially since displaced clavicle fractures usually look like this after a while.



**CLOSED TREATMENT OF DISPLACED MIDDLE-THIRD
FRACTURES OF THE CLAVICLE GIVES POOR RESULTS**

JAMES M. HILL, MICHAEL H. McGUIRE, LYNN A. CROSBY

From Creighton University, Omaha, USA

JBJS 1997



- I. No surgery for 52 midshaft displaced fractures
- II. 15% malunion
- III. 13/52 had mild to moderate residual pain
- IV. 28 had cosmetic concerns (how do you ask the question)
- V. More shortening correlate with more non-unions
- VI. 19/52 had trouble lifting over 20 lbs.
- VII. Recommend surgery

VIII. NOT A CONTROLLED STUDY

1 person's experience and opinion



There were many studies like this one.

Nonoperative Treatment Compared with Plate Fixation of Displaced Midshaft Clavicular Fractures

A Multicenter, Randomized Clinical Trial

JBJS 2007

By the Canadian Orthopaedic Trauma Society



- I. Good study- 132 patients randomly assigned
- II. Surgery group has full healing on x-ray in 16 weeks vs 28 weeks
- III. Less non-unions with surgery
- IV. No symptomatic mal-unions with surgery
- V. Better DASH scores & Constant scores with surgery



This and many similar studies concluded,

“It is best to operate on displaced midshaft clavicle fractures.”



What happens if you dive deeper into data?

- I. Good study- Meta-Analysis (six studies 412 patients)
- II. More non-unions if no surgery
- III. More non-unions that hurt if no surgery
- IV. Earlier return to function with surgery
- V. BUT they concluded, “There is little evidence... to show the long-term functional outcome of operative intervention is superior.”

JBJS 2012

675

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Operative Versus Nonoperative Care of Displaced Midshaft Clavicular Fractures: A Meta-Analysis of Randomized Clinical Trials

Robbin C. McKee, Daniel B. Whelan, MD, FRCS(C), Emil H. Schemitsch, MD, FRCS(C), and Michael D. McKee, MD, FRCS(C)

Investigation performed at St. Michael's Hospital and the University of Toronto, Toronto, Ontario, Canada



Operative Versus Nonoperative Care of Displaced
Midshaft Clavicular Fractures: A Meta-Analysis
of Randomized Clinical Trials



How can they say, “We can’t say surgery is superior?”

- more non-unions
- more symptomatic non-unions
- earlier return to function

Nobody had been following the 2 groups of patients for a long time,
and nobody had analyzed the data well.

There is a saying known to every
surgeon:

Nothing screws up good
results like long term follow-up



Cochrane Collaboration

Organisation



Cochrane is a British charity formed to organise medical research findings so as to facilitate evidence-based choices about health interventions faced by health professionals, patients, and policy makers. Cochrane includes 53 review groups that are ba... +



“...is a British charity that organizes medical research findings as to facilitate evidence based choices”

They pick controversial issues and tell us what the evidence shows



**Cochrane
Library**

Cochrane Database of Systematic Reviews

2013

**Surgical versus conservative interventions for treating
fractures of the middle third of the clavicle (Review)**

Lenza M, Buchbinder R, Johnston RV, Belloti JC, Faloppa F



- Extensive literature search and review.
- Looking for randomized or 'quasi' randomized study.
- Evaluate if study could contain bias.
- It would take an hour to describe how a Cochrane Review is done.

Cochrane 2013

Conclusion:

Low quality evidence that surgery may not result in significant improvement in arm function, may not improve pain, may not reduce incidence of treatment failures.

No evidence that surgery has benefits in terms of quality of life, and the effects of surgery on cosmetic outcome are uncertain because of the low level of evidence

Conservative care reduces the risk of infection and secondary surgery..., but we are uncertain of the effect and its precision due to the low quality of evidence.



Cochrane 2013

I think this is an indictment of the quality of the research that had been done up to then.

Further review of the the research yielded

No evidence that operating made the patients better

But Everyone is doing it.



Cochrane 2013 tells us

An in-depth analysis of available evidence indicates that surgery is not superior to sling use only.



Cochrane 2013

My summary of their conclusions:

It looks like surgery doesn't result in significant improvement in the long run.

There is no evidence that surgery makes life better.

It is uncertain if surgery improves cosmesis



More articles have questioned surgery.

Journal of Bone and Joint Surgery 2012-

One year after a displaced midshaft Fracture,

-there are more non-unions without surgery

-But....both groups had similar function and disability.



More questions arise about surgery.

Journal of Bone and Joint Surgery 2013-

Surgery does reduce the nonunion rate, and surgery is associated with better functional outcomes.

BUT-Improved outcomes appear to result from the prevention of nonunion by surgery. (more on this later)

One year after injury both groups have similar function and disability. (recurrent theme)



JBJS 2013 concluded-

The results do not support routine surgery.

One year after injury there is no difference in function or disability.

Patients increased satisfaction with surgery is mostly due to cosmesis (how is the question asked).



My Opinion

If patient satisfaction is a significant reason to justify surgery.....and

If the biggest dissatisfaction with conservative care is a bump that affects cosmesis.....

HOW DO YOU ASK THE QUESTION!!!!!!-




Surgery does not do this!!



My Opinion

HOW DO YOU ASK THE QUESTION
ABOUT COSMESIS!!!!!!-

“Does the bump bother you, especially if it is visible to others?”

Nobody will answer, “No.” Everybody wishes they didn't have a bump.

This study will register a high level of dissatisfaction regarding cosmesis.



My Opinion

Or do you say-----

Does the bump bother you so much that you wish you had surgery: even if surgery has a higher complication rate, a significant chance for a second surgery, and no proven benefit after one year.

That study will register a high level of satisfaction with cosmesis from conservative care.



But wait, there's more!

Journal of Bone and Joint Surgery 2017-
Netherlands

Great multicenter randomized and controlled study.
ABOS chosen article

Plate Fixation Compared with Nonoperative
Treatment for Displaced Midshaft Clavicle
Fractures



Journal of Bone and Joint Surgery 2017- Netherlands

Non-Unions

Sling- 23.1%

Surgery- 2.4%

need to operate on 4.8 patients to prevent 1
non-union

of the 15 non-unions in the sling group- 9 were
bothered enough to need surgery (about 15% total)



JBJS 2017-

Function at one year after injury

Similar Constant score (function) and Dash scores (disability).

In the sling group about 85% never had surgery and had a similar result to surgical group.



JBJS 2017-

Three groups

Treated with a sling and healed

Treated with a sling and needed surgery for non-union

Treated with surgery and healed

All had the same result at one year!!



JBJS 2017-
Netherlands

Second Surgeries-

Surgery Group- 10.7% needed a 2nd operation for complications:

deep infection, implant failure, nonunion.

16.7% had scheduled hardware removal at 1 year.



JBJS 2017-
Netherlands

Second Surgeries-

27.4% of those who had surgery
needed a 2nd operation!



JBJS 2017-
Netherlands

There were surgical complications

cephalic vein thrombosis, cardiac event, superficial wound infection.

More than 50% had numbness in skin near scar. This did not improve in 20% of cases.



The hardware can be uglier than a bump.



JBJS 2017- Netherlands

Surgery in the group treated with a sling-

. 15.7% (11 patients) had surgery

9- nonunions

1- malunion

1 plate removal

only 1 patient required two surgeries!



JBJS 2017- Netherlands

127% of the operative group had surgery
15% of the sling group had surgery

All the same results

Many fewer complications without surgery.



JBJS 2017- Netherlands

Sling group had more pain at 6 weeks

5% of surgeries, and 18% of slings did not like cosmesis

(How was the question asked?)



Summary:

Lower nonunion rate with surgery.

No difference in functional outcomes even if someone in the non-operative group winds up needing surgery for a non-union

No difference in functional outcomes for healed fractures in both groups.

More complications with surgery



But Wait, There's More!!!!!!



Cochrane
Library

Cochrane Database of Systematic Reviews

Surgical versus conservative interventions for treating fractures of the middle third of the clavicle (Review)

Lenza M, Buchbinder R, Johnston RV, Ferrari BAS, Faloppa F

2019

Two of the authors worked on both studies



Cochrane 2019

Conclusion:

There is low quality evidence on the effectiveness of surgical vs non-surgical treatment.

(there is no evidence that 1 is better)

There is low quality evidence that surgery may have no additional benefit in terms of pain function or quality of life.

(and they don't mention any evidence that surgery is better)



Conclusion: Cochrane 2019

The nature of adverse results needs to be taken into account—wound infection or dehiscence, or hardware irritation versus the common issues with conservative care i.e. symptomatic malunion or shoulder stiffness.

(surgery has complications. Take that into account)

It is uncertain that cosmetic results was marginally better in the surgical group

(the bumps really are not a problem).



Cochrane 2019

Conclusion:

Until conclusive evidence becomes available:

I- base treatments on an individual basis

II- Carefully consider the relative benefits and harms of each intervention

III-Consider patient preference



Clavicle story?

- Discussed for thousands of years.
- We used to try to reduce them.
- We discovered that we can't hold them reduced.
- We realized that these don't need much treatment and do well with a sling-
- We then thought there were better results with surgery. We did lots of surgery.
- We now know there is no advantage to surgery in most cases, and there may be harm.





2 Months





60 year old woman

No Pain
Almost Full motion
Back riding a bike
Big bump



The Moral of the story

Do not perform routine
surgery on displaced
midshaft Clavicle
fractures!

