RISK FACTORS IN PROXIMAL HUMERUS FRACTURES: MALES VS. FEMALES

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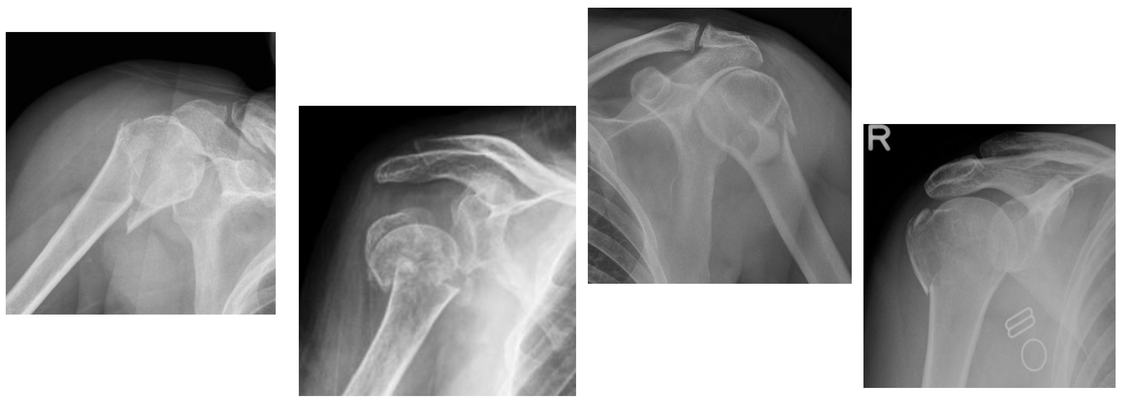
Introduction

Proximal humerus fracture is the second most common fracture of the upper extremity, following distal forearm fracture, and accounts for 10% of all fractures. Proximal humerus fractures are osteoporotic fractures that mainly affect postmenopausal women and represent a public health concern.

Risk factors identified in previous studies include: low bone mass, history of fractures, low level of physical activity, history of falls, poor vision, insulin-dependent diabetes and alcohol consumption. The purpose of the present research was to identify additional risk factors for proximal humerus fractures.



Materials and Methods

Over a 5-year period, 2317 patients were treated with humerus fractures. Retrospectively, the data of these patients were collected including demographics, medical history (inc. balance and neuromuscular problems, mental health issues, diabetes, thyroid or cardio- and peripheral vascular problems), drug history (affecting bone metabolism, HRT), family history (inc. osteoporotic fractures, bone and neuromuscular disorders), physical activity and use of walking aids, tobacco smoking and alcohol consumption, and history of falls and fractures.

Fractures were classified as per the Neer classification system: one-part, two-part, three-part or four-part fracture and their displacements (>1cm or >45^{O}). Mechanism of injury was a mechanical fall in 94% of the cohort. 177 underwent surgical fixation, while the rest were treated conservatively. All patients were followed up for a minimum period of 24 months.

Results

Proximal humerus fracture occurred more frequently in females, with a male:female ration of 1:4.

In males, the risk factors most strongly associated with these low-energy fractures were >65 years of age (RR 1.57, CI 95% 1.49-1.78), diabetes type I (RR 2.45, CI 95% 2.21-2.63), hypothyroidism (RR 1.89, CI 95% 1.64-2.09), mental health problems (RR 1.7 CI 95% 1.65-1.74), fragility (RR 2.68, CI 95% 2.42-2.81), recurrent falls (RR 3.43, CI 95% 3.25-3.67) and smoking (RR 1.87, CI 95% 1.8-2.21).

In females, the risk factors most strongly associated with these low-energy fractures were >55 years of age (RR 3.27, CI 95% 3.05-3.51), diabetes type I (RR 2.11, CI 95% 1.84-2.26), hypothyroidism (RR 2.47, CI 95% 2.12-2.74), fragility (RR 2.89, CI95% 2.62-3.28), recurrent falls (RR 3.56, CI 95% 3.33-3.89), previous fracture (RR 2.61, CI 95% 2.19-2.73) and high body mass index (RR 3.87, CI 95% 3.61-3.92).

The surgical fixation group of female patients had an increase delay in fracture healing (mean 16 weeks) when compared to male surgical fixation group (mean 14 weeks).

The conservatively managed group of female patients had an increase delay in fracture healing (mean 12 weeks) when compared to the conservatively managed male patients (mean 11 weeks).

	Males Conservative	Males Surgical	Females Conservative	Females Surgical
Excluded (DM, Thyroid, BMI, MHP, Smoking)				
Patients No.	358	43	1367	95
Time to wound healing				
Mean (weeks)	6	7	6	8
Min-Max	3-8	4-9	4-9	5-10
St. Dev.	±2	±2	±1	±1
Time to fracture union				
Mean (weeks)	11	14	12	16
Min-Max	10-14	12-19	9-14	11-20
St. Dev.	±1	±2	±2	±3

Primary outcome of the treatment groups.

Further analysis revealed a significant correlation when it comes to postoperative delayed wound healing, superficial surgical wound infection and non-union in the surgically treated female group. While the surgically treated male group had significant increase in deep surgical wound infection.

	Males Conser.	Males Surgical	Females Conser.	Females Surgical
Excluded (DM, Thyroid, BMI, MHP, Smoking)				
Patients No.	358	43	1367	95
Pain (4w)	22	3	48	8
Bleeding (4w)	0	1	0	2
Swelling (4w)	14	4	37	7
Infection- sup.	2	1	8	10 *p*<.001
Infection - deep	3	9 *P*<.001	7	2
Mal union	2	0	3	0
Delayed union	9	1	22	3
Non union	2	1	11 *P*<.001	6 *p*<.001
NV impairment	1	0	2	0
Comp. syndrome	0	0	0	0

Secondary outcome of the treatment groups.

Discussion and Conclusion

Proximal humerus fracture is a common injury in >55 years of age females.

Type I diabetes, hypothyroidism, recurrent falls and fragility are few of the most commonly known risk factors. Mental health problems and tobacco smoking appear to be male-related risk factors; while previous fracture and high BMI appear to be female-related risk factors.

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