HORMONE REPLACEMENT THERAPY IN PROXIMAL HUMERUS FRACTURE PATIENTS: EFFECT ON FRACTURE SEVERITY AND FRACTURE HEALING

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Introduction

The incidence of proximal humerus fractures is rising and they are mostly linked to osteoporosis in the elderly. In general, they result from low-energy trauma following a mechanical fall, and more predominant in females. This retrospective comparative study examines the relationship between hormone replacement therapy (HRT) and severity of proximal humerus fracture among women >45 years as well as fracture healing.

Materials and Methods

Over a 5-Year period, 2317 patients were treated with closed proximal humerus fractures. The study was conducted at the Department of Trauma & Orthopaedics, Leeds Teaching Hospitals NHS Trust, Leeds between 2009 and 2012. The inclusion criteria included: females of >45 years of age, good health status (ASA I or II only), no balance problems, no mental health issues, not diabetic , not suffering from neuromuscular weakness, not requiring a walking aid , no history of falls and no previous fractures.

822 patients were identified as suitable to be included in this study and for their data to analysed according to the study protocol. These patients were categorised into four groups according to their HRT status:
(1) Never had HRT (243 patients)
(2) Had HRT for <3 years (257 patients)
(3) Had HRT for ≥3 years (188 patients)
(4) Having HRT at time of injury (134 patients)

Primary outcome factors studied were time to fracture union and soft tissue healing. Secondary outcome factors studied were postoperative complications, and the incidence of delayed union and non-union. Radiological union required clear evidence of bridging callus and bony trabeculae traversing and obscuring the fracture line; while clinical union was a more subjective assessment of fracture stiffness. All four groups were followed up for a minimum period of 24 months.

Results

Patients who never used HRT were more likely to sustain 4-part proximal humerus fracture when compared to patients who are receiving HRT or have received HRT for <3 years or ≥ 3 years.

	Rx group (n = 822)		Never had HRT (n = 243)		Had HRT for <3 years (n = 257)		Had HRT for ≥3 years (n = 188)		Having HRT at time of injury (n = 134)		P-value
	CON	SUR	CON	SUR	CON	SUR	CON	SUR	CON	SUR	
	712	110	191	52	226	31	177	11	118	16	
Neer classification											
One-part (n=665)	661	4	159	1	215	1	174	0	113	0	.158
Two-part (n=78)	44	34	30	15	9	12	1	1	4	3	.073
Three-part (n=53)	7	46	2	20	2	12	2	7	1	4	.065
Four-part (n=26)	0	26	0	16	0	3	0	3	0	4	<.001
Fracture displacement											
<1cm or <45^{O}	661	4	159	3	215	1	174	0	113	0	-
>1cm or >45^{O}	51	106	32	49	11	30	3	11	5	16	-

HRT treatment groups: Neer classification and fracture displacement

The surgical fixation group of patients who never received HRT had an increase delay in fracture healing (mean 15 weeks) when compared to the surgical fixation group of patients receiving or have received HRT (mean 11 weeks).

	Rx group (n = 822)		Never had HRT (n = 243)		Had HRT for <3 years (n = 257)		Had HRT for ≥3 years (n = 188)		Having HRT at time of injury (n = 134)		P-value
Wound healing											
Mean (weeks)	2	3	2	4	2	3	2	3	2	3	0.032
Min-Maxi	1-2	2-5	1-2	2-5	1-2	2-4	1-2	2-3	1-2	2-3	-
SD	±1	±1	±1	±1	±1	±1	±1	±1	±1	±1	-
Time to union											
Mean (weeks)	11	13	13	15	10	11	10	11	10	11	<0.001
Min-Max	8-15	9-15	9-15	12-15	8-12	9-12	8-12	9-12	8-12	9-12	-
SD	±2	±2	±2	±1	±2	±1	±2	±1	±2	±1	-

Primary outcome of the HRT treatment groups.

The conservatively managed group of patients who never received HRT had an increase delay in fracture healing (mean 13 weeks) when compared to the conservatively managed group of patients receiving or have received HRT (mean 10 weeks).

Further analysis revealed a significant correlation when it comes to postoperative delayed wound healing, duration of postoperative pain and surgical site infections.

	Rx group (n = 822)		Never had HRT (n = 243)		Had HRT for <3 years (n = 257)		Had HRT for ≥3 years (n = 188)		Having HRT at time of injury (n = 134)		P-value
Pain (n=89)	23	66	13	43	7	18	1	3	2	2	.03
Bleeding (n=18)	2	16	2	13	0	3	0	2	0	0	.132
Swelling (n=169)	82	87	46	50	23	22	9	4	12	3	<.001
Infection - S (n=12)	5	7	2	5	3	2	0	0	0	0	.142
Infection – D (n=19)	3	16	1	13	2	1	0	1	0	1	<.001
Mal union (n=17)	17	0	6	0	4	0	3	0	4	0	.063
Delayed union (n=42)	14	28	8	18	5	9	0	0	1	1	<.001
Non-union (n=19)	17	2	8	1	5	0	2	0	2	1	.061

Secondary outcome of the HRT treatment groups.
(Infection – S: superficial infection; Infection – D: deep infection)

Discussion and Conclusion

Patients who never used HRT and undergoing surgery are more likely to sustain 4-part fracture; furthermore there is a potential significant increase in:
- Delayed fracture healing
- Postoperative delayed wound healing
- Postoperative pain
- Deep surgical site infections

Current and past use of HRT for more than 3 years appears to be associated with a reduced severity of fracture at the proximal humerus.

Furthermore, these patients were less likely to suffer from delayed union and other soft tissue problems.

The Leeds Teaching Hospitals NHS
NHS Trust