Hormone Replacement Therapy in Proximal Humerus Fracture Patients: Effect on Fracture Severity and Fracture Healing

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Target group

- **Incidence: rising** - osteoporosis - elderly.
- **Low-energy trauma** - mechanical fall - females.
- **Retrospective comparative study** - relationship:

- HRT and fracture

- Effect on wound and fracture healing

Study design

2317 patients were treated with closed injuries
Leeds Teaching Hospitals NHS Trust, UK

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
- No previous fractures.

Study groups

822 patients

- **Never had HRT**
- **Had HRT for <3 years**
- **Had HRT for ≥3 years**
- **Having HRT at time of injury**

Outcome factors

- **Primary**

- Time to fracture union

- Time to wound healing

- **Secondary**

- Post injury or postoperative complications (pain, bleeding, swelling, infection, non-union, mal union, delayed union, compartment syndrome and neurovascular impairment)

- Satisfactory RoM at 4 weeks
- Mobility at last R/V (same before injury, worse)

Demographics

Age (at time of injury)	
Mean	53.2
Minimum-Maximum	46-77
Standard deviation	±4.3
ASA	
ASA I	589
ASA II	233
Classification as per HRT	
Never had HRT	**243**
Had HRT for <3 years	**257**
Had HRT for ≥3 years	**188**
Having HRT at time of injury	**134**

Cause of injury	
Mechanical fall	733
Assaults	56
Road traffic collisions	28
Sports injuries	5
Neer classification	
One-part	665
Two-part	78
Three-part	53
Four-part	**26**

Intervention	
Conservative	712
Operative	**110**

	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	-

	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
NV impairment (n=5)	4	1	1	0	1	0	2	0	0	1	-
Comp. syndrome (n=0)	0	0	0	0	0	0	0	0	0	0	-
LRTI (n=8)	1	7	0	2	0	2	1	1	0	2	-
UTI (n=14)	2	12	0	6	2	7	0	1	0	0	.06
DVT (n=0)	0	0	0	0	0	0	0	0	0	0	-

	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
RoM (n=763)	697	66	184	**26**	221	18	177	8	115	14	**<0.001**
Last R/V											
Same (n=778)	702	76	185	33	224	24	176	9	117	10	-
Worse (n=44)	10	34	**6**	**19**	**2**	**7**	**1**	**2**	**1**	**6**	**0.002**
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	-

To take away

- Patients who never used HRT undergoing surgery:

- More likely to sustain 4-part fracture
- Increase delay in fracture healing
- Increase in postoperative delayed wound healing
- Increase in postoperative pain
- Increase in deep surgical site infections

Conclusion

- 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.

- As long as the patient had/having HRT, they are unlikely to suffer from mobility issues, delayed fracture or wound healing.

Thank you

Questions?