

# Hip Strength in Elderly Hip Fractures: Intertrochanteric Versus Femoral Neck Fracture Patients - A Retrospective Study

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**INTRODUCTION:** This study compares postoperative hip flexor and abductor muscle strength, as well as clinical outcomes, between elderly patients with femoral neck fractures and those with intertrochanteric fractures.

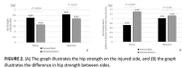
**METHODS:** We conducted a retrospective cohort study at a Level-1 trauma center involving patients aged  $\geq 60$  years who underwent surgery (hip internal fixation or hip replacement) for femoral neck or intertrochanteric fractures. Primary outcomes were postoperative hip flexion and abduction strength, with strength deficits calculated by subtracting the strength of the injured side from the normal side. Secondary outcomes included the Harris Hip Score (HHS), Barthel Index (BI) for activities of daily living, de Morton Mobility Index (DEMMI), Functional Reach Test (FRT), 5-time Sit-to-Stand Test (5TSTS), and Timed Up and Go Test (TUG). All outcomes were analyzed at 3 months of follow-up or later.

**RESULTS:** The study included 128 patients (61 with femoral neck fractures and 67 with intertrochanteric fractures) with a mean follow-up of 21 months, showing minimal baseline differences. The femoral neck fracture group demonstrated a trend towards superior mean hip flexion strength on the injured side, with an average of 6.269 kg compared to 5.612 kg in the intertrochanteric fracture group ( $p=0.054$ ). The mean hip flexion strength deficit was 0.725 kg (9.935%) on the injured side for femoral neck fractures, compared to 1.292 kg (16.092%) for intertrochanteric fractures ( $p<0.05$ ). No significant differences were found in mean hip abduction strength or abduction strength deficit on the injured side between fracture types. Clinical outcomes significantly favored femoral neck fractures in terms of HHS, DEMMI, FRT, 5TSTS, and TUG scores ( $p<0.05$ ). No difference in BI scores was observed.

**DISCUSSION AND CONCLUSION:** The intertrochanteric fracture group shows a profound loss in flexion strength, possibly due to lesser trochanter involvement compared to femoral neck fractures. However, hip abduction strength is similar in the two fracture types. Greater trochanter fractures and gluteus medius injury during nailing affect the intertrochanteric group, while surgical damage, particularly in posterior-approach hip arthroplasty in our study, may contribute to abductor weakness in femoral neck fractures. Femoral neck fractures exhibited better hip flexion strength and clinical outcomes, highlighting the need for tailored rehabilitation, postoperative care, and fall prevention. Special consideration should be given to intertrochanteric fracture patients to optimize recovery and functionality.



**FIGURE 2.** The figure illustrates hip strength measurement. Measurements were taken at 3 months for the flexion side of the thigh. 10° is regarded as 100% Cooper and healthy, and 50° for the abduction strength measurement. For comparison, a postoperative patient is shown.



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**Table 1. Demographic and Clinical Characteristics of Patients (n = 128)**

Characteristic	FNF (n=61)	ITF (n=67)	p-value
Age (Mean ± SD)	70.5 ± 7.2	71.1 ± 6.8	0.85
Gender			
Male	32 (52.5%)	35 (52.2%)	0.92
Female	29 (47.5%)	32 (47.8%)	
Weight (Mean ± SD)	65.2 ± 12.1	64.8 ± 11.9	0.98
Height (Mean ± SD)	162.3 ± 8.5	161.9 ± 8.3	0.95
Time to surgery (Mean ± SD)	18.5 ± 5.2	19.1 ± 5.5	0.78
Time to discharge (Mean ± SD)	12.1 ± 3.4	11.8 ± 3.2	0.82
Time to walk independently (Mean ± SD)	15.3 ± 4.1	15.7 ± 4.3	0.88
Time to independent walking (Mean ± SD)	18.9 ± 5.8	19.2 ± 6.0	0.91
Time to independent walking (Mean ± SD)	22.4 ± 6.5	22.8 ± 6.7	0.93
Time to independent walking (Mean ± SD)	25.9 ± 7.2	26.3 ± 7.4	0.95
Time to independent walking (Mean ± SD)	29.4 ± 7.9	29.8 ± 8.1	0.97
Time to independent walking (Mean ± SD)	32.9 ± 8.6	33.3 ± 8.8	0.99
Time to independent walking (Mean ± SD)	36.4 ± 9.3	36.8 ± 9.5	1.00
Time to independent walking (Mean ± SD)	39.9 ± 10.0	40.3 ± 10.2	1.00
Time to independent walking (Mean ± SD)	43.4 ± 10.7	43.8 ± 10.9	1.00
Time to independent walking (Mean ± SD)	46.9 ± 11.4	47.3 ± 11.6	1.00
Time to independent walking (Mean ± SD)	50.4 ± 12.1	50.8 ± 12.3	1.00
Time to independent walking (Mean ± SD)	53.9 ± 12.8	54.3 ± 13.0	1.00
Time to independent walking (Mean ± SD)	57.4 ± 13.5	57.8 ± 13.7	1.00
Time to independent walking (Mean ± SD)	60.9 ± 14.2	61.3 ± 14.4	1.00
Time to independent walking (Mean ± SD)	64.4 ± 14.9	64.8 ± 15.1	1.00
Time to independent walking (Mean ± SD)	67.9 ± 15.6	68.3 ± 15.8	1.00
Time to independent walking (Mean ± SD)	71.4 ± 16.3	71.8 ± 16.5	1.00
Time to independent walking (Mean ± SD)	74.9 ± 17.0	75.3 ± 17.2	1.00
Time to independent walking (Mean ± SD)	78.4 ± 17.7	78.8 ± 17.9	1.00
Time to independent walking (Mean ± SD)	81.9 ± 18.4	82.3 ± 18.6	1.00
Time to independent walking (Mean ± SD)	85.4 ± 19.1	85.8 ± 19.3	1.00
Time to independent walking (Mean ± SD)	88.9 ± 19.8	89.3 ± 20.0	1.00
Time to independent walking (Mean ± SD)	92.4 ± 20.5	92.8 ± 20.7	1.00
Time to independent walking (Mean ± SD)	95.9 ± 21.2	96.3 ± 21.4	1.00
Time to independent walking (Mean ± SD)	99.4 ± 21.9	99.8 ± 22.1	1.00
Time to independent walking (Mean ± SD)	102.9 ± 22.6	103.3 ± 22.8	1.00
Time to independent walking (Mean ± SD)	106.4 ± 23.3	106.8 ± 23.5	1.00
Time to independent walking (Mean ± SD)	109.9 ± 24.0	110.3 ± 24.2	1.00
Time to independent walking (Mean ± SD)	113.4 ± 24.7	113.8 ± 24.9	1.00
Time to independent walking (Mean ± SD)	116.9 ± 25.4	117.3 ± 25.6	1.00
Time to independent walking (Mean ± SD)	120.4 ± 26.1	120.8 ± 26.3	1.00
Time to independent walking (Mean ± SD)	123.9 ± 26.8	124.3 ± 27.0	1.00
Time to independent walking (Mean ± SD)	127.4 ± 27.5	127.8 ± 27.7	1.00
Time to independent walking (Mean ± SD)	130.9 ± 28.2	131.3 ± 28.4	1.00
Time to independent walking (Mean ± SD)	134.4 ± 28.9	134.8 ± 29.1	1.00
Time to independent walking (Mean ± SD)	137.9 ± 29.6	138.3 ± 29.8	1.00
Time to independent walking (Mean ± SD)	141.4 ± 30.3	141.8 ± 30.5	1.00
Time to independent walking (Mean ± SD)	144.9 ± 31.0	145.3 ± 31.2	1.00
Time to independent walking (Mean ± SD)	148.4 ± 31.7	148.8 ± 31.9	1.00
Time to independent walking (Mean ± SD)	151.9 ± 32.4	152.3 ± 32.6	1.00
Time to independent walking (Mean ± SD)	155.4 ± 33.1	155.8 ± 33.3	1.00
Time to independent walking (Mean ± SD)	158.9 ± 33.8	159.3 ± 34.0	1.00
Time to independent walking (Mean ± SD)	162.4 ± 34.5	162.8 ± 34.7	1.00
Time to independent walking (Mean ± SD)	165.9 ± 35.2	166.3 ± 35.4	1.00
Time to independent walking (Mean ± SD)	169.4 ± 35.9	169.8 ± 36.1	1.00
Time to independent walking (Mean ± SD)	172.9 ± 36.6	173.3 ± 36.8	1.00
Time to independent walking (Mean ± SD)	176.4 ± 37.3	176.8 ± 37.5	1.00
Time to independent walking (Mean ± SD)	179.9 ± 38.0	180.3 ± 38.2	1.00
Time to independent walking (Mean ± SD)	183.4 ± 38.7	183.8 ± 38.9	1.00
Time to independent walking (Mean ± SD)	186.9 ± 39.4	187.3 ± 39.6	1.00
Time to independent walking (Mean ± SD)	190.4 ± 40.1	190.8 ± 40.3	1.00
Time to independent walking (Mean ± SD)	193.9 ± 40.8	194.3 ± 41.0	1.00
Time to independent walking (Mean ± SD)	197.4 ± 41.5	197.8 ± 41.7	1.00
Time to independent walking (Mean ± SD)	200.9 ± 42.2	201.3 ± 42.4	1.00
Time to independent walking (Mean ± SD)	204.4 ± 42.9	204.8 ± 43.1	1.00
Time to independent walking (Mean ± SD)	207.9 ± 43.6	208.3 ± 43.8	1.00
Time to independent walking (Mean ± SD)	211.4 ± 44.3	211.8 ± 44.5	1.00
Time to independent walking (Mean ± SD)	214.9 ± 45.0	215.3 ± 45.2	1.00
Time to independent walking (Mean ± SD)	218.4 ± 45.7	218.8 ± 45.9	1.00
Time to independent walking (Mean ± SD)	221.9 ± 46.4	222.3 ± 46.6	1.00
Time to independent walking (Mean ± SD)	225.4 ± 47.1	225.8 ± 47.3	1.00
Time to independent walking (Mean ± SD)	228.9 ± 47.8	229.3 ± 48.0	1.00
Time to independent walking (Mean ± SD)	232.4 ± 48.5	232.8 ± 48.7	1.00
Time to independent walking (Mean ± SD)	235.9 ± 49.2	236.3 ± 49.4	1.00
Time to independent walking (Mean ± SD)	239.4 ± 49.9	239.8 ± 50.1	1.00
Time to independent walking (Mean ± SD)	242.9 ± 50.6	243.3 ± 50.8	1.00
Time to independent walking (Mean ± SD)	246.4 ± 51.3	246.8 ± 51.5	1.00
Time to independent walking (Mean ± SD)	249.9 ± 52.0	250.3 ± 52.2	1.00
Time to independent walking (Mean ± SD)	253.4 ± 52.7	253.8 ± 52.9	1.00
Time to independent walking (Mean ± SD)	256.9 ± 53.4	257.3 ± 53.6	1.00
Time to independent walking (Mean ± SD)	260.4 ± 54.1	260.8 ± 54.3	1.00
Time to independent walking (Mean ± SD)	263.9 ± 54.8	264.3 ± 55.0	1.00
Time to independent walking (Mean ± SD)	267.4 ± 55.5	267.8 ± 55.7	1.00
Time to independent walking (Mean ± SD)	270.9 ± 56.2	271.3 ± 56.4	1.00
Time to independent walking (Mean ± SD)	274.4 ± 56.9	274.8 ± 57.1	1.00
Time to independent walking (Mean ± SD)	277.9 ± 57.6	278.3 ± 57.8	1.00
Time to independent walking (Mean ± SD)	281.4 ± 58.3	281.8 ± 58.5	1.00
Time to independent walking (Mean ± SD)	284.9 ± 59.0	285.3 ± 59.2	1.00
Time to independent walking (Mean ± SD)	288.4 ± 59.7	288.8 ± 59.9	1.00
Time to independent walking (Mean ± SD)	291.9 ± 60.4	292.3 ± 60.6	1.00
Time to independent walking (Mean ± SD)	295.4 ± 61.1	295.8 ± 61.3	1.00
Time to independent walking (Mean ± SD)	298.9 ± 61.8	299.3 ± 62.0	1.00
Time to independent walking (Mean ± SD)	302.4 ± 62.5	302.8 ± 62.7	1.00
Time to independent walking (Mean ± SD)	305.9 ± 63.2	306.3 ± 63.4	1.00
Time to independent walking (Mean ± SD)	309.4 ± 63.9	309.8 ± 64.1	1.00
Time to independent walking (Mean ± SD)	312.9 ± 64.6	313.3 ± 64.8	1.00
Time to independent walking (Mean ± SD)	316.4 ± 65.3	316.8 ± 65.5	1.00
Time to independent walking (Mean ± SD)	319.9 ± 66.0	320.3 ± 66.2	1.00
Time to independent walking (Mean ± SD)	323.4 ± 66.7	323.8 ± 66.9	1.00
Time to independent walking (Mean ± SD)	326.9 ± 67.4	327.3 ± 67.6	1.00
Time to independent walking (Mean ± SD)	330.4 ± 68.1	330.8 ± 68.3	1.00
Time to independent walking (Mean ± SD)	333.9 ± 68.8	334.3 ± 69.0	1.00
Time to independent walking (Mean ± SD)	337.4 ± 69.5	337.8 ± 69.7	1.00
Time to independent walking (Mean ± SD)	340.9 ± 70.2	341.3 ± 70.4	1.00
Time to independent walking (Mean ± SD)	344.4 ± 70.9	344.8 ± 71.1	1.00
Time to independent walking (Mean ± SD)	347.9 ± 71.6	348.3 ± 71.8	1.00
Time to independent walking (Mean ± SD)	351.4 ± 72.3	351.8 ± 72.5	1.00
Time to independent walking (Mean ± SD)	354.9 ± 73.0	355.3 ± 73.2	1.00
Time to independent walking (Mean ± SD)	358.4 ± 73.7	358.8 ± 73.9	1.00
Time to independent walking (Mean ± SD)	361.9 ± 74.4	362.3 ± 74.6	1.00
Time to independent walking (Mean ± SD)	365.4 ± 75.1	365.8 ± 75.3	1.00
Time to independent walking (Mean ± SD)	368.9 ± 75.8	369.3 ± 76.0	1.00
Time to independent walking (Mean ± SD)	372.4 ± 76.5	372.8 ± 76.7	1.00
Time to independent walking (Mean ± SD)	375.9 ± 77.2	376.3 ± 77.4	1.00
Time to independent walking (Mean ± SD)	379.4 ± 77.9	379.8 ± 78.1	1.00
Time to independent walking (Mean ± SD)	382.9 ± 78.6	383.3 ± 78.8	1.00
Time to independent walking (Mean ± SD)	386.4 ± 79.3	386.8 ± 79.5	1.00
Time to independent walking (Mean ± SD)	389.9 ± 80.0	390.3 ± 80.2	1.00
Time to independent walking (Mean ± SD)	393.4 ± 80.7	393.8 ± 80.9	1.00
Time to independent walking (Mean ± SD)	396.9 ± 81.4	397.3 ± 81.6	1.00
Time to independent walking (Mean ± SD)	400.4 ± 82.1	400.8 ± 82.3	1.00
Time to independent walking (Mean ± SD)	403.9 ± 82.8	404.3 ± 83.0	1.00
Time to independent walking (Mean ± SD)	407.4 ± 83.5	407.8 ± 83.7	1.00
Time to independent walking (Mean ± SD)	410.9 ± 84.2	411.3 ± 84.4	1.00
Time to independent walking (Mean ± SD)	414.4 ± 84.9	414.8 ± 85.1	1.00
Time to independent walking (Mean ± SD)	417.9 ± 85.6	418.3 ± 85.8	1.00
Time to independent walking (Mean ± SD)	421.4 ± 86.3	421.8 ± 86.5	1.00
Time to independent walking (Mean ± SD)	424.9 ± 87.0	425.3 ± 87.2	1.00
Time to independent walking (Mean ± SD)	428.4 ± 87.7	428.8 ± 87.9	1.00
Time to independent walking (Mean ± SD)	431.9 ± 88.4	432.3 ± 88.6	1.00
Time to independent walking (Mean ± SD)	435.4 ± 89.1	435.8 ± 89.3	1.00
Time to independent walking (Mean ± SD)	438.9 ± 89.8	439.3 ± 90.0	1.00
Time to independent walking (Mean ± SD)	442.4 ± 90.5	442.8 ± 90.7	1.00
Time to independent walking (Mean ± SD)	445.9 ± 91.2	446.3 ± 91.4	1.00
Time to independent walking (Mean ± SD)	449.4 ± 91.9	449.8 ± 92.1	1.00
Time to independent walking (Mean ± SD)	452.9 ± 92.6	453.3 ± 92.8	1.00
Time to independent walking (Mean ± SD)	456.4 ± 93.3	456.8 ± 93.5	1.00
Time to independent walking (Mean ± SD)	459.9 ± 94.0	460.3 ± 94.2	1.00
Time to independent walking (Mean ± SD)	463.4 ± 94.7	463.8 ± 94.9	1.00
Time to independent walking (Mean ± SD)	466.9 ± 95.4	467.3 ± 95.6	1.00
Time to independent walking (Mean ± SD)	470.4 ± 96.1	470.8 ± 96.3	1.00
Time to independent walking (Mean ± SD)	473.9 ± 96.8	474.3 ± 97.0	1.00
Time to independent walking (Mean ± SD)	477.4 ± 97.5	477.8 ± 97.7	1.00
Time to independent walking (Mean ± SD)	480.9 ± 98.2	481.3 ± 98.4	1.00
Time to independent walking (Mean ± SD)	484.4 ± 98.9	484.8 ± 99.1	1.00
Time to independent walking (Mean ± SD)	487.9 ± 99.6	488.3 ± 99.8	1.00
Time to independent walking (Mean ± SD)	491.4 ± 100.3	491.8 ± 100.5	1.00
Time to independent walking (Mean ± SD)	494.9 ± 101.0	495.3 ± 101.2	1.00
Time to independent walking (Mean ± SD)	498.4 ± 101.7	498.8 ± 101.9	1.00
Time to independent walking (Mean ± SD)	501.9 ± 102.4	502.3 ± 102.6	1.00
Time to independent walking (Mean ± SD)	505.4 ± 103.1	505.8 ± 103.3	1.00
Time to independent walking (Mean ± SD)	508.9 ± 103.8	509.3 ± 104.0	1.00
Time to independent walking (Mean ± SD)	512.4 ± 104.5	512.8 ± 104.7	1.00
Time to independent walking (Mean ± SD)	515.9 ± 105.2	516.3 ± 105.4	1.00
Time to independent walking (Mean ± SD)	519.4 ± 105.9	519.8 ± 106.1	1.00
Time to independent walking (Mean ± SD)	522.9 ± 106.6	523.3 ± 106.8	1.00
Time to independent walking (Mean ± SD)	526.4 ± 107.3	526.8 ± 107.5	1.00
Time to independent walking (Mean ± SD)	529.9 ± 108.0	530.3 ± 108.2	1.00
Time to independent walking (Mean ± SD)	533.4 ± 108.7	533.8 ± 108.9	1.00
Time to independent walking (Mean ± SD)	536.9 ± 109.4	537.3 ± 109.6	1.00
Time to independent walking (Mean ± SD)	540.4 ± 110.1	540.8 ± 110.3	1.00
Time to independent walking (Mean ± SD)	543.9 ± 110.8	544.3 ± 111.0	1.00
Time to independent walking (Mean ± SD)	547.4 ± 111.5	547.8 ± 111.7	1.00
Time to independent walking (Mean ± SD)	550.9 ± 112.2	551.3 ± 112.4	1.00
Time to independent walking (Mean ± SD)	554.4 ± 112.9	554.8 ± 113.1	1.00
Time to independent walking (Mean ± SD)	557.9 ± 113.6	558.3 ± 113.8	1.00
Time to independent walking (Mean ± SD)	561.4 ± 114.3	561.8 ± 114.5	1.00
Time to independent walking (Mean ± SD)	564.9 ± 115.0	565.3 ± 115.2	1.00
Time to independent walking (Mean ± SD)	568.4 ± 115.7	568.8 ± 115.9	1.00
Time to independent walking (Mean ± SD)			