Implant Cut-out following Cephalomedullary nailing of Intertrochanteric Femur Fractures: Are Helical Blades to Blame?

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Introduction

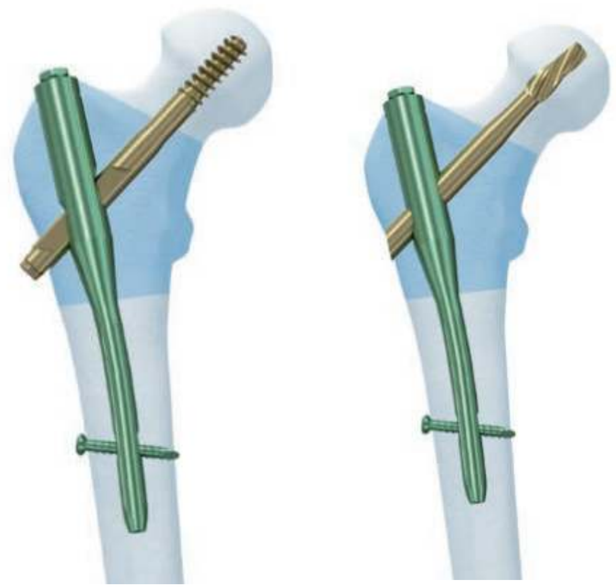
Implant cut-out remains a common cause of cephalomedullary nail (CMN) failure. Recent studies have suggested an increased rate of CMN cut-out with helical blade as opposed to lag screws[1].

Objective

The objective of this study was to compare rates of implant cut-out between CMNs fixed proximally with helical blades and lag screws to determine the effect of proximal fixation method on risk for cut-out.

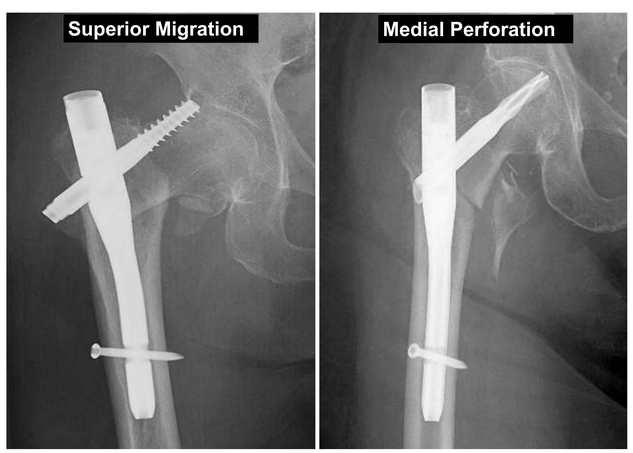
Methods

313 patients were retrospectively reviewed over an 8-year period (Jan 1, 2009 to Dec 30, 2017); **245 patients** were treated with helical blades and **68** with lag screws. Radiographs were reviewed for fracture pattern, Tip-Apex Distance (TAD), Parker's Ratio (PR) and reduction quality. Regression analysis



Cut-out by Superior Migration only

	Helical Blade (233)	Lag Screw (68)	p
Cut-out	3	5	**0.02**
Healed	230	63	



Results

22 cut-outs occurred; 15 with helical blades and 5 with lag screws. No difference the rate of cut-out was observed between the two groups (p = 0.45). **Poor fracture reduction** was found to be a significant predictor of implant failure via bivariate and multiple logistic regression analysis (p = <0.01, OR 23.573). Failure by medial perforation occurred in 12 instances, all involving helical blades. Failure by superior migration occurred at significantly higher rate with lag screws than helical blades (p = 0.02).

Logistic Regression Analysis

	OR	95% CI	p
Age			
≥80 vs. <80	0.660	0.218–2.000	0.46
Gender			
Female vs Male	0.776	0.211–2.849	0.70
Osteoporosis			
Prior Dx vs No Prior Dx	1.239	0.392–3.915	0.72
Fracture Type			
Stable vs Unstable	3.130	0.859–11.406	0.08
Proximal Fixation			
Helical Blade vs Lag Screw	1.188	0.338–4.169	0.79
Tip-Apex Distance			
≥25 vs <25	0.925	0.301–2.841	0.89
Parker's Ratio			
≥0.45 vs <0.45	1.935	0.621–6.035	0.26
Fracture Reduction			
Good/Acceptable vs Poor	23.537	5.374–102.995	**<0.01**
Surgeon Trauma Experience			
Fellowship vs No Fellowship	2.713	0.816–9.016	0.10

Bivariate Analysis

	Healed (293)	Failed (20)	p
Age			0.24
<80 years	120	6	
≥80 years	173	14	
Gender			0.39
Male	76	4	
Female	217	16	
Osteoporosis			0.16
Prior Diagnosis	66	7	
No Prior Diagnosis	227	13	
Fracture Type			0.26
Stable	191	15	
Unstable	102	5	
Proximal Fixation			0.45
Helical Blade	230	15	
Lag Screw	63	5	
Implant Length			0.82
Short	206	15	
Intermediate	4	0	
Long	83	5	
Parker's Ratio			0.24
<0.45	61	6	
≥0.45	232	14	
Tip-Apex Distance			0.22
<25	207	12	
≥25	86	8	
Fracture Reduction			**<0.01**
Good or Acceptable	286	14	
Poor	7	6	
Surgeon Trauma Experience			0.051
Fellowship Trained	254	14	
No Fellowship	39	6	

Conclusions

CMN cutout is likely multifactorial. A direct association between helical blade fixation and implant cut-out was not observed. Amongst modifiable risk factors for implant failure, poorer fracture reduction was predictive of failure by cut-out. Subgroup analysis highlights differing modes of failure between lag screws and helical blades.

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