

The Role of Obesity in Bilateral Slipped Capital Femoral Epiphysis

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Background and Purpose

Background

Slipped capital femoral epiphysis (SCFE) (Figure 1) is a common hip disorder in adolescents. Little information has been published regarding risk factors for bilateral SCFE (BL-SCFE), and there is considerable controversy surrounding prophylactic pinning of the contralateral hip in patients with unilateral SCFE (UL-SCFE).

Purpose

The purpose of this study was to evaluate obesity and other clinical features as potential risk factors for BL-SCFE, and to investigate trends in body weight in the post-operative period following surgical treatment of SCFE.

Methods

Inclusion Criteria

- Patients Surgically treated with single screw in-situ fixation for SCFE. (Figure 2)
- At least 3 months of follow-up after the last surgical intervention
- Patients without a history of endocrinopathy or other pathology or co-morbidity

Study Groups

- Included patients were further subdivided into;
 1. BL-SCFE or UL-SCFE, based on whether contralateral hip had SCFE or not
 2. BL-SCFE further segregated into those with 'concurrent BL-SCFE' or 'sequential BL-SCFE'
- Patients prophylactically pinned on a contralateral hip were considered UL-SCFE patients

Data collection

- Age at presentation, slip chronicity, slip stability and slip grade were recorded
- BMI (kg/m^2) recorded preoperatively and between 3 to 5 months after the last SCFE surgery for patients with BL-SCFE and at the time of last clinical visit for UL-SCFE patients
- Patients were dichotomized as 'obese' or 'not-obese', if their BMI \geq 95th percentile in accordance with the Center for Prevention and Disease Control (CDC) guidelines

Statistical Analysis

- Multivariate logistic regression analysis was used to identify potential risk factors for BL-SCFE (Table 1)
- Bivariate logistic regression analysis was performed to assess BMI category changes association with development of sequential BL-SCFE (Figure 3)



Figure 2. Bilateral SCFE treated with in-situ fixation with cannulated screw

Figure 1. Anterior Posterior radiograph illustrating a moderate SCFE slip (Arrow)



	Unilateral SCFE (n = 114)	Bilateral SCFE (n = 43)	p-value†
Gender, no. (%)			0.303
Male	60 (52.6)	28 (61.7)	
Female	54 (47.4)	17 (38.3)	
Age at first SCFE, yrs, no. (%)			0.823
Age \leq 10	12 (10.5)	11 (24.5)	
Age > 10	102 (89.5)	34 (75.5)	
Slip Chronicity, no. (%)			0.085
Acute	19 (16.7)	13 (29.8)	
Chronic	95 (83.3)	31 (69.2)	
Slip Stability [‡] , no. (%)			0.504
Stable	95 (83.3)	36 (78.7)	
Unstable	19 (16.7)	69 (21.3)	
Severity of slip [§] , no. (%)			0.379
Grade I	75 (65.8)	27 (60.0)	
Grade II	17 (14.9)	10 (22.3)	
Grade III	22 (19.3)	6 (13.3)	
Post Op. BMI ^{95th Percentile} , no. (%)	81 (71.0)	40 (88.5)	0.003

† Wald test for association between variables. ‡ Not defined when 95th CI

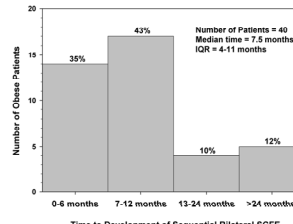
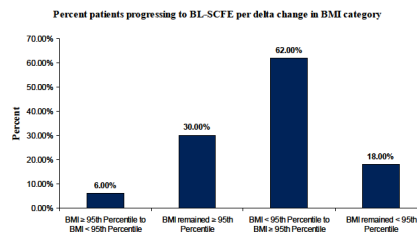


Figure 4. Median time to contralateral slip amongst sequential BL-SCFE patients

Figure 3.

Graph showing percentage of patients with BMI category changes amongst sequential BL-SCFE patients.



Results

- One hundred seventy nine (35.6%) patients met all inclusion criteria
- 114 (63.7%) were UL-SCFE vs. 65 (36.3%) BL-SCFE, 45 (69.2%) of BL-SCFE had 'sequential' slips
- A hundred forty three patients (79.9%) had a BMI \geq 95th percentile at first presentation, compared to 140 patients (78.2%) at the last follow-up
- Only postoperative obesity ($OR=3.7$, 95% CI: 1.5-9.5, $p=0.003$) and age \leq 10 years-old at first SCFE ($OR=2.5$, 95% CI: 1.3-5.7, $p=0.023$) were significant risk factors for development of sequential BL-SCFE
- Patients whose BMI decreased to < 95th percentile were significantly less likely to progress to BL-SCFE than patients who remained obese ($OR=0.16$, 95% CI: 1.2 - 116.5, $p=0.026$)
- Gender, slip-stability, slip-chronicity, and slip-grade were not significant risk factors for BL-SCFE
- Median time to the contralateral slip was 7.5 months with an interquartile-range of 4-11 months (Figure 4)

Discussion and Conclusion

Discussion

- Patients with UL-SCFE whose BMI was \geq 95th percentile postoperatively have a 3.7 greater chance of developing a contralateral slip, independent of any other variable, when compared to those whose BMI decreased or remained <95th percentile
- The 79.9% obesity prevalence is a strong indicator of the association between preoperative obesity and SCFE incidence
- The different definition of 'obesity' used in this study might have masked any potential difference amongst UL-SCFE and BL-SCFE subgroups preoperatively.
- Patients who decreased their BMI sufficiently to fall out of the obesity range were significantly less likely ($OR=0.16$) to have a sequential contralateral slip than those who remained obese
- Sequential bilateral SCFE slips, occurred as early as one month after the first SCFE surgery, median time 7.5 months (IQR: 4-11 months), which speaks to the importance of early weight management intervention

Conclusion

- In the current study, obesity and age \leq 10 years-old represented significant risk factors for BL-SCFE, while gender, slip-chronicity, slip-stability, and slip-grade were not risk factors
- Weight gain or persistence of BMI \geq 95th percentile was associated with increased risk of developing BL-SCFE, while sufficient weight reduction after SCFE surgery was associated with significantly lower risk of development of contralateral SCFE
- The importance of early supervised therapeutic weight management programs for patients treated for UL-SCFE cannot be over-emphasized

