

Concurrent Surgery for Hip Fractures is Associated with an Increased Risk for Postoperative Complications

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INTRODUCTION:

Concurrent surgery refers to a situation in which a single attending surgeon supervises two or more operations at the same time. Although the practice may ensure efficient deployment of surgical resources, media reports suggest a link with postoperative complications. Public response to these reports has been immediate and dramatic, with significant debate among surgical leaders and policymakers ensuing; including a United States Senate Inquiry and formal American College of Surgeons policy. For these reasons, we investigated the prevalence and safety of concurrent hip fracture surgery in our single payer healthcare system.

METHODS:

We conducted a population-based, retrospective, matched-cohort study in Ontario, Canada. Health administrative databases identified subjects aged 60+ that received isolated hip fracture fixation between 2009-2014. Concurrent hip fracture cases were defined as those that overlapped in time with any other orthopaedic case performed by the same attending surgeon. Concurrent hip fractures were matched to hip fractures that were managed non-concurrently on the age and sex of the patient, the procedure (screw and plate, hemiarthroplasty, or IM nail), the primary surgeon and the hospital. We compared surgical complications at 90 days and one year between the matched groups. We also performed a secondary regression analysis looking at the impact of duration of overlap on the rates of complications in concurrent cases.

RESULTS:

Between 2009-2014 in our jurisdiction, 1,085 (or 2.8%) of 39,395 eligible hip fracture surgeries were performed concurrently. The most common procedures performed at the same time as these hip fractures included: total hip arthroplasty (13%), other hip fracture fixation (10%), total knee arthroplasty (7%), ankle fixation (6%), and knee arthroscopy (5%). A total of 966 concurrent hip fracture cases were successfully matched to 996 non-concurrent hip fracture cases (standardized differences <10% for all covariates). Concurrent patients were at increased risk for surgical complications at 90 days (7% vs. 4.7%, p=0.008) and at one year (8.6% vs. 6%, p=0.01). Our secondary analysis found that increasing duration of overlap was associated with an increased risk for complication (adjusted OR 1.08 per 10 minutes of overlap, p=0.002).

DISCUSSION AND CONCLUSION:

To our knowledge, this is the first population-based study examining the consequences of concurrent surgery. We found that concurrent cases were at increased risk for early and late surgical complications, compared with hip fractures that were managed non-concurrently.

Table 1: Selection of patients for inclusion

	N
Hip fracture fixation procedures in Ontario between April 1, 2009 to March 31, 2014	49,051
Exclusion criteria	
Prior hip fracture	1,859
Age < 60	3,356
Associated fractures	2,084
Cancer diagnosis	198
Osteomyelitis or infection prior to admission	20
Prior total hip replacement (within 5y)	804
Non-Ontario resident	30
Died before or during surgery	8
Treated by non-Orthopaedic surgeon	329
Missing surgery start or end-time data	415
Final cohort	39,858

Table 2: Baseline characteristics of hip fracture patients operated on concurrently and non-concurrently, before and after matching

	Before Matching			After Matching		
	Concurrent	Non-concurrent	Standardized Difference	Concurrent	Non-concurrent	Standardized Difference
Number of patients	361 (3.3%)	36,497 (91.9%)		361 (3.3%)	36,137 (91.6%)	
Demographics						
Age (yr) (Mean [SD])	66.17 (8.0)	66.07 (8.0)	0.04	66.17 (8.0)	66.07 (8.0)	0.02
Female (%)	69.07 (24.6)	69.07 (24.6)	0.04	69.07 (24.6)	69.07 (24.6)	0.03
Region (N) (%)						
1	131 (36.3%)	6,826 (18.7%)	0.01	131 (36.3%)	6,826 (18.7%)	0.1
2	148 (41.0%)	7,980 (21.6%)	0.01	148 (41.0%)	7,980 (21.6%)	0.03
3	106 (29.3%)	5,647 (15.3%)	0.08	106 (29.3%)	5,647 (15.3%)	0.02
4	76 (21.0%)	3,991 (10.8%)	0.08	76 (21.0%)	3,991 (10.8%)	0.02
5	10 (2.8%)	511 (1.4%)	0.11	10 (2.8%)	511 (1.4%)	0.02
6	10 (2.8%)	511 (1.4%)	0.14	10 (2.8%)	511 (1.4%)	0.06
Comorbidities						
Diabetes (%)	38.00 (10.5%)	11,828 (32.7%)	0.01	38.00 (10.5%)	11,828 (32.7%)	0.08
Heart (%)	21.47 (5.9%)	7,037 (19.3%)	0.01	21.47 (5.9%)	7,037 (19.3%)	0.06
Cholesterol (Mean [N] (%))	163.0 (10.0%)	163.0 (10.0%)	0.00	163.0 (10.0%)	163.0 (10.0%)	0.01
1	100 (27.7%)	3,541 (9.7%)	0.00	100 (27.7%)	3,541 (9.7%)	0.00
2	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
3	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
4	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
5	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
6	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
7	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
8	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
9	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
10	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
11	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
12	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
13	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
14	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
15	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
16	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
17	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
18	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
19	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
20	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
21	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
22	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
23	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
24	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
25	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
26	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
27	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
28	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
29	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
30	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
31	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
32	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
33	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
34	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
35	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
36	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
37	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
38	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
39	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
40	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
41	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
42	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
43	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
44	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
45	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
46	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
47	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
48	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
49	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
50	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
51	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
52	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
53	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
54	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
55	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
56	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
57	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
58	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
59	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
60	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
61	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
62	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
63	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
64	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
65	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
66	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
67	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
68	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
69	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
70	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
71	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
72	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
73	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
74	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
75	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
76	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
77	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
78	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
79	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
80	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
81	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
82	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
83	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
84	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
85	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
86	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
87	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
88	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
89	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
90	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
91	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
92	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
93	146 (40.4%)	5,047 (13.9%)	0.00	146 (40.4%)	5,047 (13.9%)	0.01
94	146 (40.4%)	5,047 (13.9%)	0.00	146 (40		