http://dx.doi.org/10.2106/JBJS.K.00972

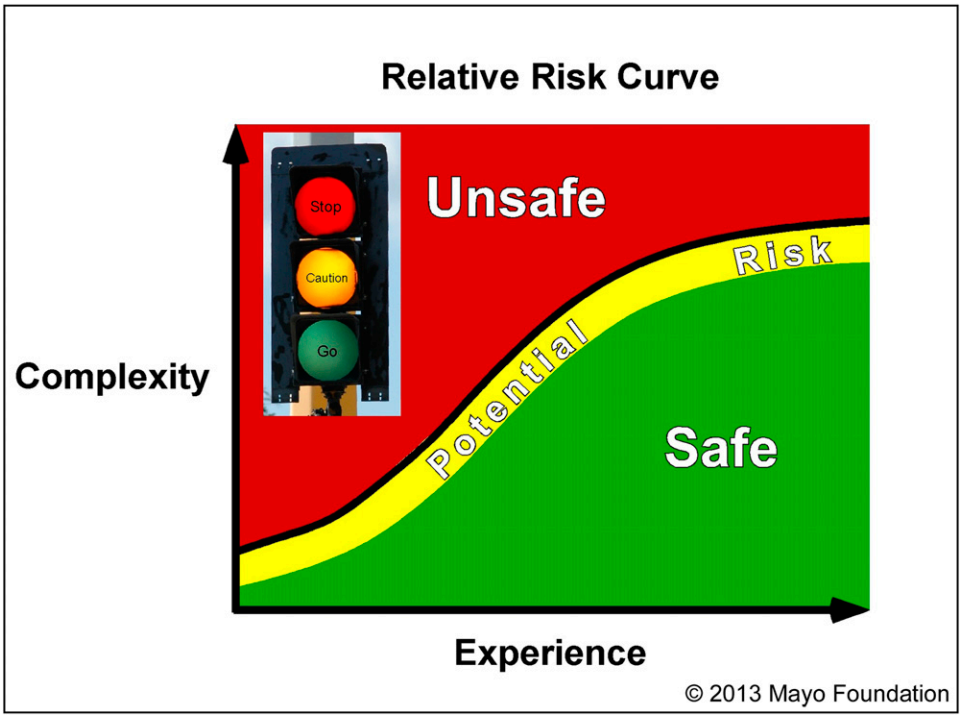

Fig. E-1

Relative risk curve. In elbow arthroscopy, the region ''above the curve'' is unsafe. A surgeon operating above his or her curve exposes the patient to an unnecessary risk of nerve injury during elbow arthroscopy. This is true for surgeons at all levels of experience. A safe surgeon, on the other hand, will operate with a ''margin of safety'' by staying well below his or her curve, thereby avoiding the ''potential risk zone.'' (By permission of the Mayo Foundation for Medical Education and Research. All rights reserved.)

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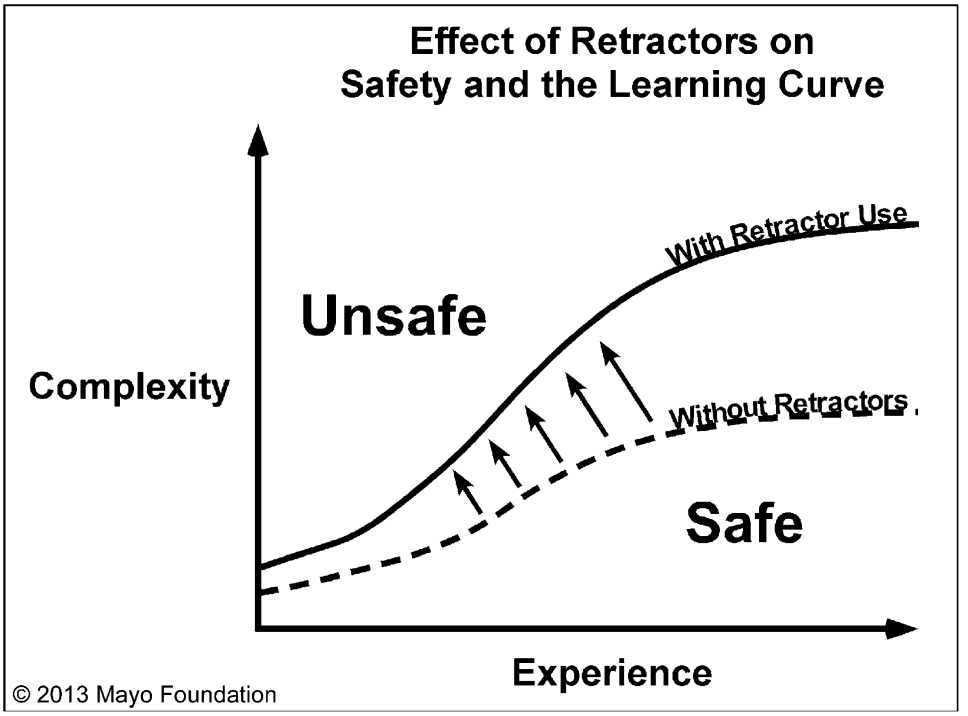

Fig. E-2

Shifting the risk curve to the left has two simultaneous beneficial effects. It decreases the risk for any procedure of a given level of complexity. It also increases the level of complexity of the procedures that a surgeon at any given level of experience can perform. Retractor use is one example of a technical factor that can greatly shift the curve to the left. (By permission of the Mayo Foundation for Medical Education and Research. All rights reserved.)

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TABLE E-1 Permanent Major Nerve Injuries Associated with Elbow Arthroscopy in the Literature

Study	Arthroscopic Procedure	Nerve Injured	Details
Guhl, 1985[21]	Not specified	Radial sensory	Stab wound for portal establishment
Casscells, 1987[19]	Capsular release, debridement	Ulnar	Transection with burr
Lynch et al., 1986[25]	Not specified	Medial antebrachial cutaneous	Neuroma requiring later neurectomy
Thomas et al., 1987[28]	Synovectomy	Radial	Transection
Jones and Savoie, 1993[17]	Capsular release	Posterior interosseous	Transection by shaver
Miller et al., 1995[38]	Synovectomy	Median	Nerve transection
Savoie and Field, 1996[27]	Multiple including capsular release, heterotopic bone excision	Posterior interosseous (2) and ulnar (1)	Nerve transection
Ruch and Poehling, 1997[29]	Rheumatoid synovectomy	Anterior interosseous	Direct transection
Hahn and Grossman, 1998[24]	Synovectomy, debridement of exostosis	Ulnar	Transection
Haapaniemi et al., 1999[23]	Contracture release	Median and radial	Complete transection
Reddy et al., 2000[26]	Synovectomy, loose body removal	Ulnar	Complete transection
Gupta and Sunil, 2004[22]	Unknown (patient referred from outside with injury after arthroscopy)	Posterior interosseous	Complete division
Nguyen et al., 2006[5]	Capsular release	Medial antebrachial cutaneous	Neuroma
Dumonski et al., 2006[20]	Debridement for osteochondritis dissecans	Ulnar	Contusion seen at exploration, with persistent clawing, sensory loss
Park et al., 2007[39]	Capsular release	Radial	Transient thermal injury
Gay et al., 2010[8]	Revision arthroscopic capsular release	Ulnar	Complete transection

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TABLE E-2 Summary of Neurologic Complications in the Present Series*

			Deficit						
			Sensory				Motor		
	Preop. Nerve Symptoms	MABC	Ulnar	Radial	Medial	Ulnar	Radial	Medial
Arthroscopic injuries								
1	None			+			+	
2	None		+			+		
3	None		+			+		
4	None	CN						
5	None	CN						
Tourniquet palsies								
6	None		+	+	+	+	+	+
7	Ulnar neuropathy, slight sensory and motor		+	+	+		+	+
8	None		+	+	+	+	+	+
9	Diffuse numbness, not specific			+	+		+	+
10	None		+	+	+			
11	None		+	+	+			
12	None		+	+	+			
13	None				+			
14	None		+	+	+			
15	Ulnar dysesthesia after trauma 30 d before surgery		+					
Secondary to transposition								
16	None		+		+	+		
17	None		+					
18	None	PB	+					
Cutaneous nerve injury from open incision								
19	None	PB						
20	None	PB						
21	None	PB						
22	Ulnar neuropathy	PB						
23	Ulnar occasional symptoms	PB						
24	Ulnar occasional symptoms	PB						

*Of the twenty-four patients with nerve palsies, the etiologies were thought to be directly related to the arthroscopic procedure in five, prolonged total tourniquet time (TTT) in ten, ulnar nerve transposition in three, and cutaneous nerve injury related to open skin incision in seven. Patient 18 had two possible causes of nerve injury: prolonged tourniquet time and skin incision. MABC = medial antebrachial cutaneous nerve, CN = common MABC nerve, PB = posterior branch, transp. = transposition, and cutan. incis. = cutaneous incision.

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TABLE E-2 (*continued*)

TTT *(min)*	Possible Etiologies	Suspected Cause	Resolution	Time to Resolution
120	Retractor	Retractor	Complete	3 d
77	Retractor	Retractor	Complete	1 d
130	Local anesthetic	Local anesthetic	Complete	Overnight
65	Blunt injury	Portals	Complete	90-420 d
79	Blunt injury	Portals	Complete	90 d
345		TTT	Complete	2 d
120		TTT	Complete	2 d
222		TTT	Complete	2 d
125		TTT	Complete	1 d
120		TTT	Complete	1 d
181		TTT	Complete	2 d
120		TTT	Complete	2 d
121		Possible TTT	Complete	2 d
113		Possible TTT	Complete	2 d
159		Possible TTT + preexisting nerve injury	Complete	1 d
134	Transp.	Possible TTT + transp.	Complete	3 d
143	Transp.	Transp.	Complete	3 d
135	Transp.	Transp. + possible TTT + lesion of the PB of the MABC during cutan. incis. for ulnar nerve transp.	Complete	1 d ulnar, 120 d MABC
81	Cutan. incis.	Cutan. incis. for open ulnar nerve transp.	Unknown	
95	Transp., cutan. incis.	Cutan. incis. for open ulnar nerve transp.	Complete	365 d
111	Transp., cutan. incis.	Cutan. incis. for open ulnar nerve transp.	Complete	730 d
90	Transp., cutan. incis.	Cutan. incis. for open ulnar nerve transp.	Complete	120 d
144	Cutan. incis.	Cutan. incis. for open ulnar nerve transp.	Complete	180 d
90	Cutan. incis.	Cutan. incis. for open ulnar nerve transp.	Complete	150 d