Table 1 Acromial Complication

		No (n = 100)		Yes (n = 9)		Total (n = 109)	
		Count	%	Count	%	Count	%
Approach	**Inlay**	49	49.0%	2	22.2%	51	46.8%
	Onlay	51	51.0%	7	77.8%	58	53.2%
BMI	**BMI < 30**	52	52.0%	7	77.8%	59	54.1%
	BMI > 30	48	48.0%	2	22.2%	50	45.9%
Age	**Age < = 70**	55	55.0%	3	33.3%	58	53.2%
	Age > 70	45	45.0%	6	66.7%	51	46.8%
Sex	**Female**	65	65.0%	9	100.0%	74	67.9%
	Male	35	35.0%	0	0.0%	35	32.1%
Laterality	**Right**	64	64.0%	5	55.6%	69	63.3%
	Left	36	36.0%	4	44.4%	40	36.7%

Paper #17 PERSISTENT GLENOID COMPONENT RETROVERSION IS ASSOCIATED WITH RADIOLUCENCY AS MEASURED WITH A MINIMAL RADIATION TECHNIQUE AFTER TOTAL SHOULDER ARTHROPLASTY

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Introduction: Post-operative glenoid retroversion has been shown in biomechanical, finite element analysis, and clinical studies to be related to the development of radiolucency and component loosening, one of the most common causes of failure after total shoulder arthroplasty (TSA). We analyzed version correction after TSA and the associated risk of developing glenoid component radiolucency at minimum 2-year follow-up. A minimal radiation method was validated in a cadaveric model and utilized in a clinical series to measure post-operative glenoid component version using routine post-operative X-rays, pre-operative CT scan, and a software algorithm.

Methods: A validation study was performed utilizing 14 pre- and post-operative CT scans and radiographs on cadaveric shoulders that underwent implantation of a glenoid TSA component. Glenoid component version was determined with a protocol using Mimics software (Materialise, Leuven, Belgium), performed by aligning post-operative radiographs with a 3D scapula model generated from the pre-operative CT. The position of the glenoid component was then calculated relative to the pre-operative scapula model revealing its version. A clinical validation was also performed on 4 patients who underwent TSA with a post-operative CT to directly measure the glenoid component version. A retrospective analysis of 15 TSA patients with minimal radiation technique (without post-operative CT scan) were analyzed for component version (Fig. 1) and radiographic development of radiolucent lines at a minimum of 2 years post-operatively. Glenoid radiolucency Lazarus scores 0-2 were defined as low-grade and 3-5 as high-grade. Pre-operative glenoid version was measured both using 3D-corrected CT scans and with Glenosys software (Imascap, Plouzane, France). Patients were analyzed based on their radiolucency grade and differences in pre-operative version, post-operative version, and version correction.

Results: There were statistically significant differences between the post-operative glenoid component retroversion of TSA patients with low-grade and high-grade radiolucent line scores (1.9 vs. 11.3 degrees, $P = .006$). The average difference in glenoid component retroversion between the gold-standard post-operative CT and the minimal radiation X-ray method was 1.6 degrees (0.01-4.8 deg) with excellent correlation ($r = 0.96$, $P < .0001$). There was significant improvement in the accuracy of this minimal radiation method over traditional CT version measurements, including 3D-corrected, mid-glenoid, and inferior-to-coracoid methods, as well as axillary XR measurements. These traditional version measurement techniques differed significantly from the gold-standard post-operative CT by 3.3 degrees ($P = .02$), 4.4 degrees ($P < .01$), 11.0 degrees ($P < .01$), and 7.7 degrees ($P < .01$), respectively.

Conclusions: There is an association between developing high-grade radiolucency of TSA glenoid components at 3.3 year follow-up and increased post-operative glenoid component retroversion. There is also an association between high-grade radiolucency and increased pre-operative glenoid retroversion. Post-operative glenoid component retroversion can be measured using a minimal radiation method with standard post-operative X-rays and a preoperative CT scan to within 1.5 degrees of the gold-standard post-operative CT measurement technique.

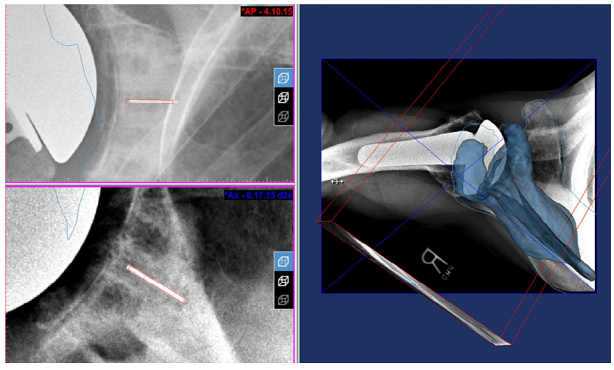

Figure 1 Post-operative glenoid component retroversion measurement utilizing minimal radiation technique with standard post-operative radiograph. By aligning the post-operative AP and axillary X-rays with the projected silhouette of the pre-operative 3D scapula model (right image blue model), the position of the glenoid component metal marker can be determined with respect to the pre-operative 3D scapula model using Mimics software (left top and bottom images). Once this position has been determined, glenoid component version can be measured and compared to pre-operative glenoid version.