

## Can we decipher indications and outcomes of the PHILOS plate for fractures of the proximal humerus?

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Sir,

I read with interest the recent article by Zhou et al. [1] describing the outcome of the proximal humeral internal locking system (PHILOS) plate in 74 patients. However, I am still unsure of the exact indications for the plate. Despite the escalation in the use and publications regarding the outcome of the PHILOS plate, the evidence as to whether this device is beneficial to patients it was designed for remains difficult to decipher. There have been 27 studies of the 63 cited on PubMed that have used the Constant score as their outcome assessment tool (Table 1). There is, however, marked heterogeneity between these studies, with mean age ranging from 42 to 78 years and reported cohort size ranging from nine to 294 fractures. It is interesting to note the epidemiology of proximal humeral fractures where the mean age is 65 years [2], with three- and four-part fractures occurring in older patients [3]. Mean patient age in those studies reporting the outcome of the PHILOS is 62 years old, which may suggest that there is an inclusion bias for some studies, which may reserve such an intervention for younger patients. However, this does seem to be at odds with the design and intention of the PHILOS plate.

Furthermore the Constant score has been demonstrated to diminish with patient age in a normal population [4]. The

variation in the reported Constant score after PHILOS plating ranges from 58 to 95 (Table 1). In part, this probably reflects the differing mean age between study cohorts. However, even if these scores are adjusted for patient age, the variation in score ranges from 24 points less than predicted to 21 points greater than predicted for their age (Fig. 1). This variation may also be due to inclusion criteria of the studies, which may reflect that only higher functioning patients were offered surgery. However, it is hard to believe that most patients will regain their prior functional status or even improve relative to their predicted score.

The only randomised controlled trial comparing the outcome of the PHILOS plate with conservative management for proximal humeral fractures in elderly patients concluded that there was no statistical difference in any of the outcome measures assessed [5]. The authors also demonstrated a reoperation rate of 17%. The cost and complication risk of operative intervention with a PHILOS plate would seem, on current evidence, to be of no significant benefit to the elderly patients for which this plate was designed. Hence, it would seem the PHILOS plate is not for the masses, and its insertion should be performed by the few.

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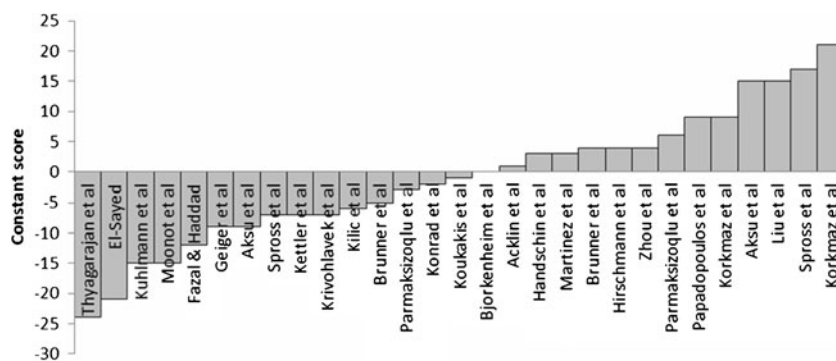
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**Table 1** Twenty-seven studies identified on PubMed (search term “PHILOS plate”) that report the outcome of the proximal humeral internal locking system (PHILOS) plate using the Constant score as their measure

Author	Year	Number	Age	Constant score		
				Reported	Predicted <sup>a</sup>	Difference
Brunner et al	2012	16	61	81	77	4
Zhou et al	2012	74	57	86	82	4
Aksu et al	2012	9	75	87	72	15
Spross et al	2012	294	73	89	72	17
Acklin et al	2012	29	64	78	77	1
Kuhlmann et al	2012	30	69	62	77	-15
Spross et al	2012	44	75	65	72	-7
Konrad et al	2012	153	65	75	77	-2
El-Sayed	2010	59	42	65	86	-21
Hirschmann et al	2011	57	65	81	77	4
Parmaksizoqlu et al	2010	12	56	88	82	6
Parmaksizoqlu et al	2010	19	67	74	77	-3
Aksu et al	2010	103	62	68	77	-9
Thyagarajan et al	2009	30	58	58	82	-24
Geiger et al	2010	28	61	68	77	-9
Liu et al	2010	17	71	87	72	15
Papadopoulos et al	2009	29	62	86	77	9
Brunner et al	2009	158	65	72	77	-5
Fazal & Haddad	2009	27	56	70	82	-12
Martinez et al	2009	58	61	80	77	3
Kilic et al	2008	22	57	76	82	-6
Krivohlavek et al	2008	49	57	75	82	-7
Korkmaz et al	2008	24	47	95	86	9
Korkmaz et al	2008	17	78	93	72	21
Handschin et al	2008	31	62	80	77	3
Moonot et al	2007	32	60	67	82	-15
Kettler et al	2006	225	66	70	77	-7
Koukakis et al	2006	20	62	76	77	-1
Bjorkenheim et al	2004	72	67	77	77	0

<sup>a</sup>Predicted constant score according to age of the reported cohort [4]

**Fig. 1** Difference in the reported Constant score relative to patient age-matched score for the 27 identified studies reporting the outcome of the proximal humeral internal locking system (PHILOS) plate



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