SHOT PERFORMANCE USING ANCHORED LONG PUTTING CLUBS

Ian Kenny and Ian Sherwin

Biomechanics Research Unit, University of Limerick, Limerick, Ireland

The study purpose was to measure putting outcome performance when different length putters were used with an anchoring mechanism. 72 skilled golfers each executed a total of 60 putts using standard, belly and long putters from two distances. Putting mechanics were assessed using SAM PuttLab™. From 1.83 m (6 ft) participants holed 80.3% of putts with a standard length putter, dropping to 78.6% and 75.3% for belly and long-handled putters. At 3.66 m (12 ft) participants holed 51.7% of putts with a standard length putter, and 50.8% and 46.9% for belly and long-handled putters. Shot performance showed no significant differences between clubs. There were significant ($p<0.05$) between-club differences for swing time, putter head rotation and putter face impact spot. While anchoring may reduce putter head rotation it does not sufficiently limit rotation.

KEY WORDS: golf, performance, putter length, putting.

INTRODUCTION: The aim of the putting stroke is to start the ball with the intended speed on the intended line (Karlsen, 2010). A statement (Associated Press, 28th November 2012) by both governing bodies of golf the USGA and the R&A Ltd. introduced the possibility of a ban on using an anchoring mechanism while putting but made it very clear that the ban did not apply to the equipment, only the manner in which it is being used. As it stands the rules of the game will not allow the ban to come into play until January 2016. The proposal is to introduce Rule 14-1(b) which will read, "In making a stroke, the player must not anchor the club, either 'directly' or by use of an 'anchor point' (Figure 1). There were no empirical data offered during the statement to suggest that putters which use an anchoring mechanism (the belly putter and the long putter) made golf easier or improved performance. A good technique is crucial to create confidence in this area of the game and the ability to create a stable posture and pivot point is essential if the putter is to be returned consistently from the point of address to the moment of impact (Hurrion and Hurrion, 2008). The aim of the current study was to examine putting outcome performance and establish if there is a performance advantage to be gained by using an anchored putter.

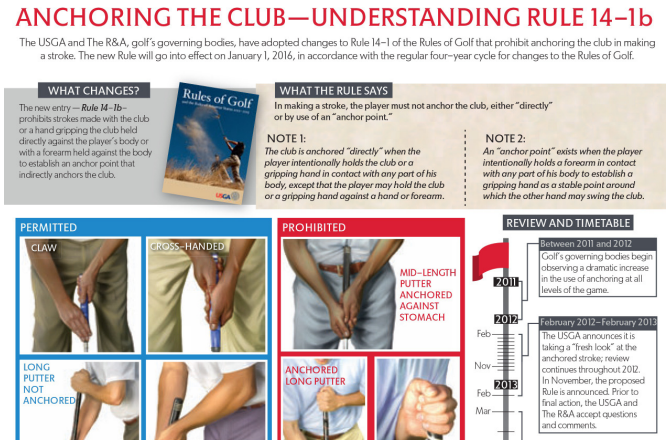

Figure 1: Extract from proposals for the new anchoring rule in golf (R&A Ltd, 2014).

METHODS: Seventy-two healthy golfers (62 male, 10 female) participated ranging in age from 15 to 75. Participants were free from injury and held a current Golfing Union of Ireland (GUI) Handicap across the full spectrum from category 1 (≤5 handicap) to the top of category 5 (≤28 handicap). Seventy one of the seventy two participants were habitual standard length

putter users. All participants were right handed and were recruited through club notice boards, weekly newsletters and word of mouth. Approval for the use of human participants was obtained from the university review board of research compliance. Participants were informed of the experimental risks and signed an informed consent document before the investigation. All putting clubs and balls used in the study were of premium standard and supplied by Titleist Golf™. The specifications for each of the putters are listed in Table 1.

Table 1
Technical specifications of the putters used in the study

Putter	Loft (°)	Lie (°)	Length (m / inch)	Total mass (kg)	Neck
Standard	4	71	0.887 (34)	0.55	Single Bend
Belly	4	71	1.092 (43)	0.70	Single Bend
Long	4	79	1.321 (52)	0.85	Double Bend

The current study was conducted outdoors thus creating an ecologically sound natural environment for participants. The putt was straight and flat and thus did not require the participants to read the green. The reading from the Stimpmeter was 9.5 – 10.0. Putting parameters were recorded with a three-dimensional kinematic system (SAM PuttLab™, Science and Motion GmbH, Mainz, Germany) (Marquardt, 2007; Karlsen, Smith & Nilsson, 2008; Sones et al., 2012). Each participant was allowed to warm-up in a self-selected manner with a familiarisation practice period of ten minutes. No tuition was given. Calibration was achieved by lining up putts and as required using a laser device to align the putter head with the hole. This provided a relative calibrated start position for all golfers. Each participant was then asked to perform ten putts with each club from both distances. The order in which the putters were used was random as was the order from which distance the participant started. Belly and long putter clubs were used with an anchoring mechanism. Measures of backswing time (BSTIME), forward swing time from beginning of the forward swing to impact with the ball (TIMP), putter face angle at impact (FACEIMP), putter face rotation angle from the beginning of the forward swing to impact (ROTIMP) and horizontal putter impact spot (SPOTIMP) were recorded. In addition performance outcome measures data for successful and unsuccessful putts were amalgamated. Descriptive statistics and inter-putter variance was statistically analysed using a one-way analysis of variance (ANOVA) with a Bonferroni post-hoc test applied to any measures that showed significant variance. Significance level was set at 0.05.

RESULTS: Shown in Table two are the total number of putts holed and the percentage of successful putts with each putter, for all categories of golfer handicap, for short 1.83 m (6 ft) putts, and 3.66 m (12 ft) data are shown in Table three. Golfers were found to be most successful with the standard length putter from both distances. Table 4 illustrates the mean and standard deviation for all subjects using the three different putters from both distances, for the measures previously described. There was no significant club difference for FACEIMP for any of the putters. However significant differences were observed between clubs for all the other variables.

Table 2
Performance outcome scores for all participants from 1.83 m (6 ft) with three different putting clubs

All handicap categories from 1.83 m (6 ft)	TOTAL	%
Total successful putts with standard putter out of 720	578	80.3
Total successful putts with belly putter out of 720	566	78.6
Total successful putts with long handled putter out of 720	542	75.3
Total successful putts out of 2160	1686	78.1

Table 3
Performance outcome scores for all participants from 3.66 m (12 ft) with three different putting clubs

All handicap categories from 3.66 m (12 ft)	TOTAL	%
Total successful putts with standard putter out of 720	372	51.7
Total successful putts with belly putter out of 720	366	50.8
Total successful putts with long handled putter out of 720	338	46.9
Total Successful Putts out of 2160	1076	49.8

Table 4
Descriptive measures (mean ± SD) for three putting clubs at two shot distances

Putter	BSTIME (ms)	TIMP (ms)	FACEIMP (°)	ROTIMP (°/sec)	SPOTIMP (mm)
STANDARD (both distances)	604.12 ± 135.87 [a]	277.7 ± 59.89 [b]	0.23 ± 3.37	4.9 ± 3.04 [d]	1.03 ± 8.44 [a]
BELLY (both distances)	621.29 ± 137.28 [a]	283.02 ± 60.71 [c]	0.25 ± 2.9	4.96 ± 2.83 [d]	-0.25 ± 8.72 [a]
LONG (both distances)	634.04 ± 126.52 [a]	290.55 ± 62.34 [b c]	0.33 ± 3.06	4.33 ± 2.52 [d]	1.09 ± 8.66 [a]
STANDARD 1.83 m	590.00 [b] ± 139.70	277.72 ± 62.03 [b]	0.29 ± 3.31	4.36 ± 2.58 [b]	2.11 ± 6.72 [f]
BELLY 1.83 m	599.25 ± 135.83	279.73 ± 63.55 [c]	0.44 ± 2.89	4.22 ± 2.50 [c]	-0.07 ± 8.29 [f]
LONG 1.83 m	609.93 ± 126.39 [b]	290.46 ± 69.89 [b c]	0.60 ± 3.17	3.74 ± 2.16 [b c]	1.03 ± 9.13
STANDARD 3.66 m	618.24 ± 130.54 [f b]	277.69 ± 57.72 [a]	0.18 ± 3.42	5.44 ± 3.35 [b]	0.11 ± 8.53
BELLY 3.66 m	643.33 ± 135.28 [f]	286.32 ± 57.59 [a]	0.06 ± 2.93	5.69 ± 2.94 [c]	-0.44 ± 9.13 [c]
LONG 3.66 m	658.15 ± 122.07 [b]	290.64 ± 53.81 [a]	0.06 ± 2.92	4.92 ± 2.71 [b c]	1.14 ± 8.17 [c]

[a] between clubs p < 0.05, post-Hoc 1v2, 1v3 *[b] between clubs p < 0.05, post-Hoc 1v3*
[c] between clubs p < 0.05, post-Hoc 2v3 *[d] between clubs p < 0.05, post-Hoc 1v3, 2v3*
[e] between clubs p < 0.05, post-Hoc 1v2, 2v3 *[f] between clubs p < 0.05, post-Hoc 1v2*
1=STANDARD 2=BELLY 3=LONG

DISCUSSION: The purpose of the present study was to examine putting outcome performance using different length putting clubs used with an anchoring mechanism. No significant club differences existed for overall shot performance. Significant differences were noted for backswing time (BSTIME), forward swing time (TIMP), putter face rotation from the beginning of the forward swing to impact (ROTIMP) and horizontal impact spot (SPOTIMP). Sones et al. (2012) found that using an anchored putter will not change your stroke and that the stroke performance with a standard putter will be the same as that with a belly putter and vice versa. Overall, results from the current study would suggest that is not the case, however, when the data are separated by distance there was no difference in backswing time between the standard putter and belly putter on a 1.83 m (6 ft) putt but there was a difference on a longer putt of 3.66 m (12 ft). Swing tempo ratio however, was not affected.

Pelz (2000) established that face angle contributes to 83% of the effect on the putt line but also not hitting the ball out of the sweet spot will have an adverse effect on the speed and distance control of the ball. This effect can be minimised by consistently hitting the ball in the same spot on the clubface. Both putter head path rotation through impact (ROTIMP) and putter face impact location (SPOTIMP) are important factors when trying to hit the ball out of the 'sweet spot'. The results of the current study showed that there was a significant difference in ROTIMP and SPOTIMP between the standard and belly putter and the belly and long putter. While an anchoring mechanism may reduce putter head rotation via reduced degree-of-freedom of the wrists, it does not sufficiently limit rotation. MacKenzie et al (2010) and Karlsen et al (2008) showed that while impact location may vary, it does not have a large influence on short putt success from four metres.
Participants in the current study were successful 78.06% of the time from 1.83 m (6 ft) irrespective of which putter they used. This is compared to a 75.45% on the PGA Tour from the same distance for the top thirty golfers in 2014. For longer 3.66 m (12 ft) putts, on average the participants in this study were successful 49.8% of the time from this distance compared to 35.4% on the PGA Tour top thirty over a similar distance of 3.05m (10ft) to 4.57m (15ft). As in the case of the shorter putt (1.83 m, 6 ft) players were more successful with the standard putter (51.7%) than the other two putters, 50.8% and 49.6% for the belly and long putters respectively.

CONCLUSION: For a large cohort of different handicap golfers not accustomed to using longer putters, using an anchored putter will not necessarily provide a scoring advantage over using a standard putter without an anchoring system. All trials showed more successful putts with the standard putter. This study tested seventy two golfers on a one-off test and no training or tuition was given to the participants. Further study is needed to test what effect a training programme may have on all golfers. Experimenting with different types of putter and grips would be useful in finding a putting method and style that suits each individual golfer. Results showed that all golfers, regardless of which putter used, coped with changes in putter face impact location and rotation angle by very consistent swing tempo and putter face angle at impact. Anchoring does not seem to provide a putting performance advantage.

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