



Comparison of water filled and air charged catheters for use in pressure flow study for male patients

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The Aim of this study

We investigated to compare the data of pressure flow study using WFC (Water filled catheter) and ACC (Air charged catheter) systems to examine the agreements for the gradings of obstruction and detrusor contractility on the basis of BOOI/BCI and Schäfer nomogram for male patients.

Methods

From the UDS database between 2017 and 2018, the male patients who underwent consecutive pair of pressure flow study (WFC and ACC systems) were selected for this study. First pressure flow study using WFC were performed. ACC were inserted for consecutive pressure flow study followed by the removal of WCCs. Generally all UDS procedures were performed on the basis of ICS good urodynamics 2016. The pressure flow study date using WFC and ACC systems were compared. The grading of BOO and detrusor contractility in both systems were evaluated using BOOI & BCI and Schäfer nomogram. The agreements of Qmax and PdetQmax between two catheter systems were assessed using the **Bland and Altman analysis**. **Cohen's kappa estimation** was used for the agreements of grading of BOO and bladder contractility between these catheter systems.

Results

Twenty-five male patients were selected to evaluate comparison of WFC and ACC system. The average age was 74.2 ± 5.8 years old. Their symptoms were difficulty on urination 19, incontinence 2, nocturia 2, pollakiuria 2, respectively. Applying the Bland and Altman method, the values of Qmax are similar (mean differences 0.3ml/s)(Fig1), however, the values of PdetQmax in the WFC systems are higher than that in the ACC (mean differences 4.6cmH₂O) (Fig2). There were wide 95% limits for agreement for difference in both Qmax and PdetQmax (-3.9 to 4.5 mL/s and -12.6 to 21.8 cmH₂O, respectively)(Table 1). Cohen's kappa for obstruction and detrusor contractility estimated using BOOI and BCI were 0.802 and 0.696 respectively. Cohen's kappa for grading of obstruction and detrusor contractility using Schäfer nomogram, were 0.433 and 0.682 respectively (Table 2). Less agreement in Schäfer nomogram may be due to more fine grading compared with that in BOOI and BCI.

Table 1 Cohen's kappa estimates in BOOI and BCI

1)Agreement of Degree of obstruction on the basis of BOOI				
ACCs	WFC			Total
	unobstructed	equivocal	obstructed	
unobstructed	8	2	0	10
equivocal	0	2	0	2
obstructed	0	1	12	13
Total	8	5	12	25
agreement	8	2	12	22
by chance	3.2	0.4	6.24	9.84
kappa	0.802111 almost perfect agreement			

2)Agreement of Degree of detrusor contractility on the basis of BCI				
ACCs	WFC			Total
	weak	normal	strong	
weak	12	3	0	15
normal	1	8	0	9
strong	0	0	1	1
Total	13	11	1	25
agreement	12	8	1	21
by chance	7.8	3.96	0.04	11.8
kappa	0.69697 substantial agreement			

Table 2. Cohen's kappa estimates in Schäfer Nomogram

1)Agreement of grading of obstruction								
ACC	WFC							Total
	0	I	II	III	IV	V	VI	
0	2	4	0	0	0	0	0	6
I	0	4	1	0	0	0	0	5
II	0	0	1	1	0	0	0	2
III	0	0	0	2	2	0	0	4
IV	0	0	0	0	3	2	0	5
V	0	0	0	0	1	2	0	3
VI	0	0	0	0	0	0	0	0
Total	2	8	2	3	6	4	0	25
agreement	2	4	1	2	3	2	0	14
by chance	0.48	1.6	0.16	0.32	0.6	2.4	0	5.56
kappa	0.434156 moderate agreement							

2)Agreement of grading of detrusor contractility							
ACC	WFC						Total
	VW	W-	W+	N-	N+	ST	
VW	1	0	0	0	0	0	1
W-	1	4	2	0	0	0	7
W+	0	0	4	1	0	0	5
N-	0	0	1	7	2	0	10
N+	0	0	0	0	2	0	2
ST	0	0	0	0	0	0	0
Total	2	4	7	8	4	0	25
agreement	1	4	4	7	3	0	19
by chance	0.08	1.12	1.4	3.2	0.32	0	6.12
kappa	0.682203 substantial agreement						

Figure1 Bland-Altman Plot: Comparison of Qmax with water filled catheter and air charged catheter

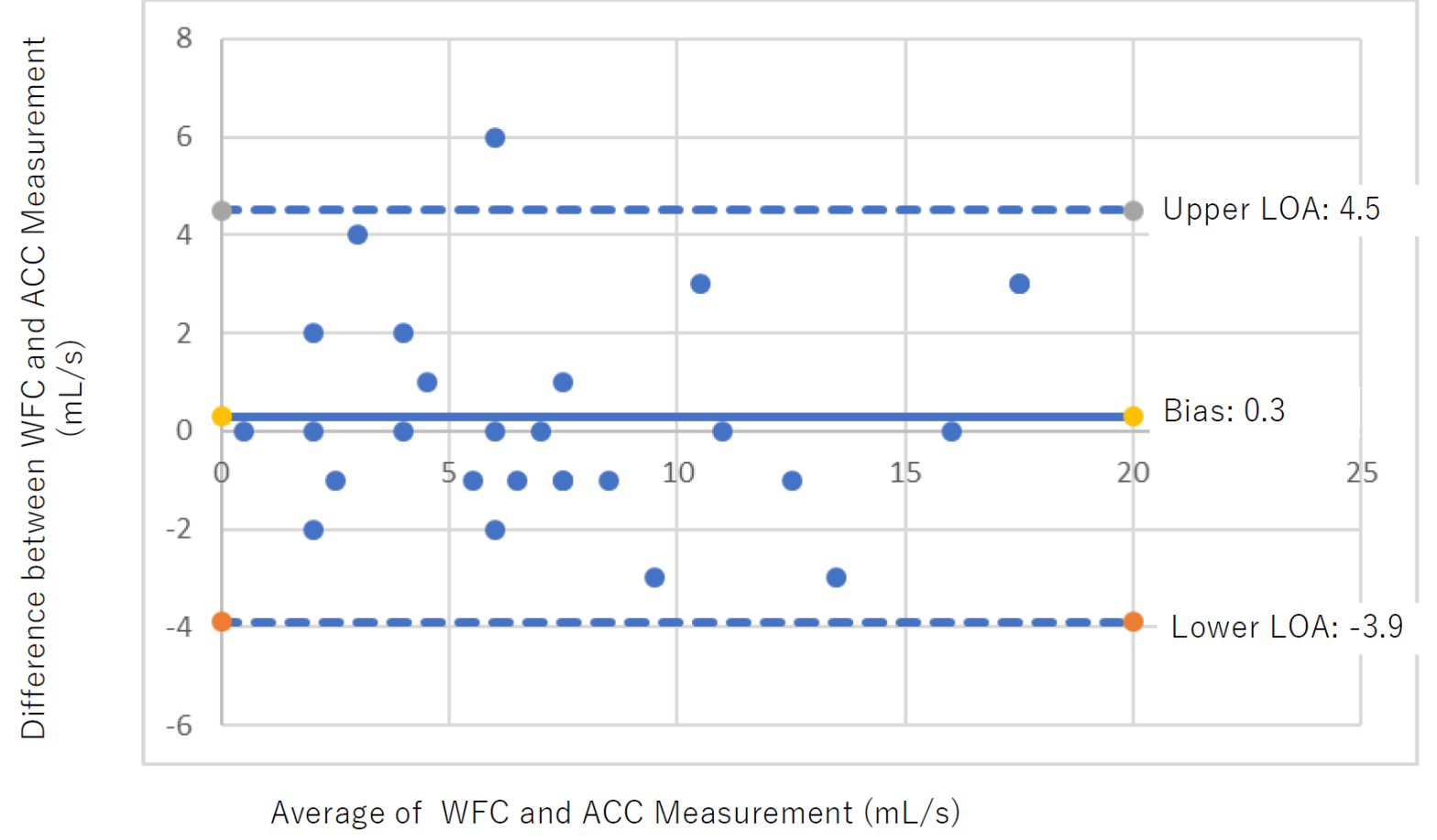
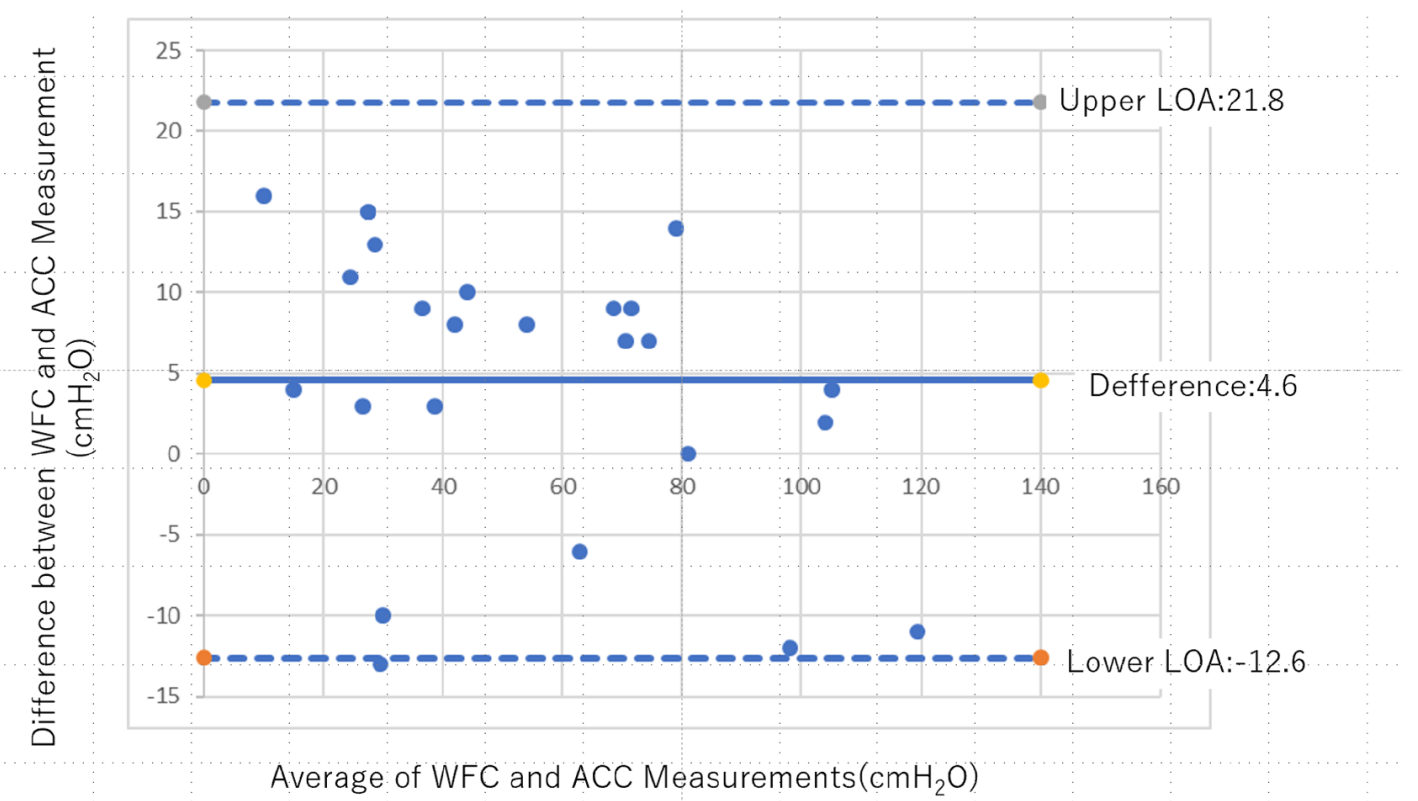


Figure2 Bland-Altman Plot: Comparison of PdetQmax with water filled catheter and air charged catheter



Interpretation

These findings suggested that PdetQmax in PFS using ACC and WFS systems appeared to be not simply interchangeable and Qmax may be interchangeable because of small mean differences. Cohen's kappa may suggest that the agreement of grading of obstruction and detrusor contractility using BOOI and BCI appeared to be almost perfect and substantial and those using Schäfer nomogram appeared to be substantial /moderate. Less agreement in Schafer nomogram maybe due to more fine grading compared with that in BOOI and BCI.

Eri LM (3) reported that median Pdet@Qmax was 9.5% lower and median BOOI was 10.7% lower at second void compared to first void during the same pressure flow study(p<0.0001), indicating less obstructed state at second void.

Decreased PdetQmax and less obstructed category in BOOI and Schafer nomogram at second voids is similar to our result. Less obstructed tendency at second voids might be due to experimental design.

Conclusions

The pressure flow study using an air-charged catheter may be a possible alternative to that using a water filled catheter system. This is small scale study, therefore, a greater number of cases is needed to generalize this concept.

References

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- 3) Journal of Urology 2001;165:1188-1192