

VOLUME VARIATION WITH THE CURRENT STANDARD SLEEVE GASTRECTOMY TECHNIQUE COMPARED TO TECHNIQUE EMPLOYING PRESSURE-SENSITIVE GASTRIC CALIBRATION TUBE: PRELIMINARY TESTING

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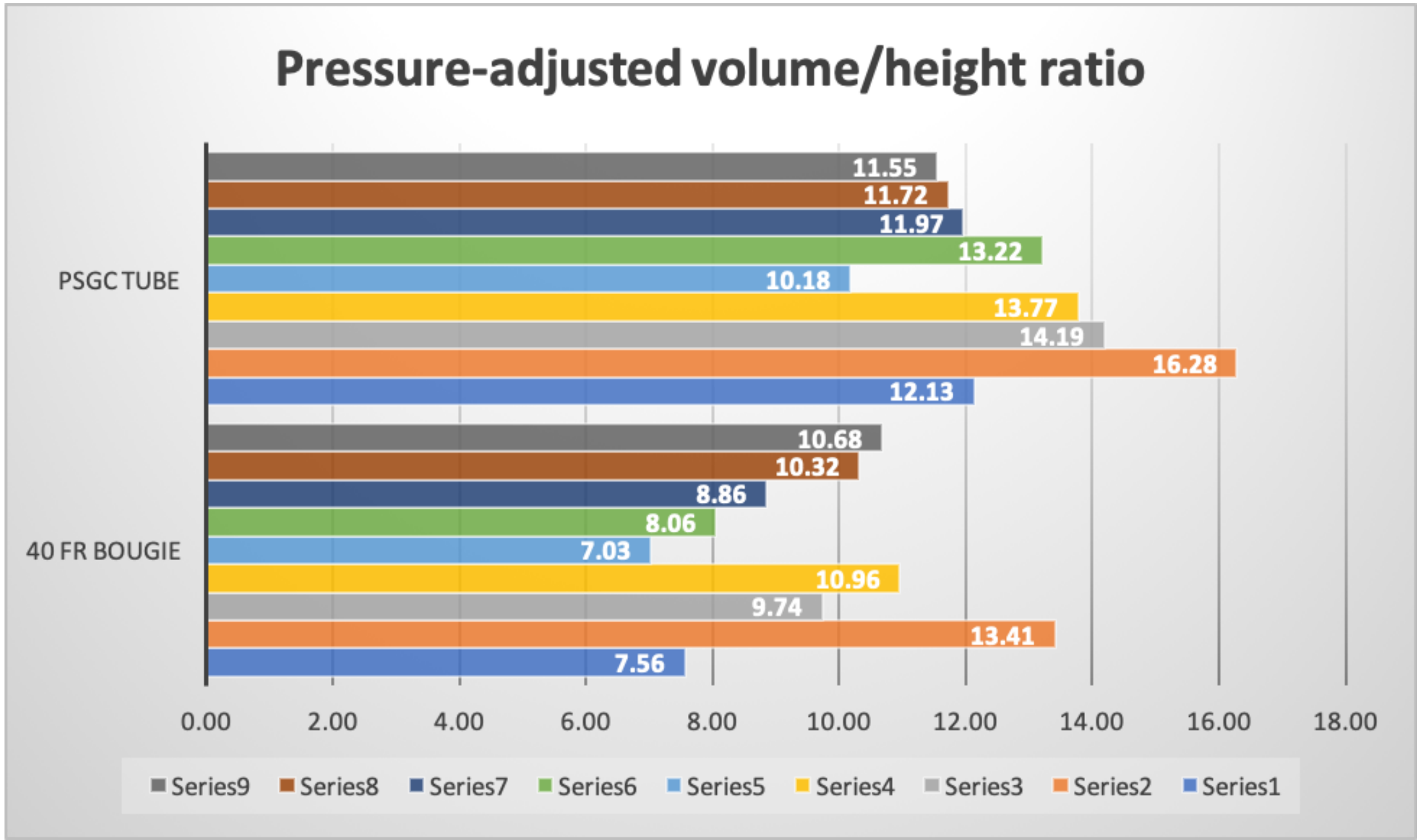
Introduction

- The current sleeve gastrectomy technique is dependent on bougie size and the surgeon's execution.
- The objective of this experiment was to establish the variability of sleeve gastrectomy sleeve size in gastric explants, and compare that with the variability of sleeve size when performed with a volume and pressure-sensitive gastric calibration tube.

Methods and Procedures

- Sleeve gastrectomy was performed on gastric explants using a standard 40 Fr bougie by three operators of varying experience.
- The sleeve was measured consistently beginning 5 cm from the pylorus and was tightened around the 40 fr bougie.
- After sleeve completion, volume was assessed by filling with water and pressure was monitored by needle manometry.
- A similar process followed, but a pressure-sensitive gastric calibration (PSGC) tube, with distal balloon filled with 75 cc after insertion into the explant, replaced the bougie.
- Measurements after stapling included gastric volume at specified pressure, and gastric height.
- Notable calculations included pressure-adjusted volume/height ratio; intra-operator and inter-operator ranges, variances, and F-tests of these adjusted values; as well as inter-operator interquartile ranges (IQR), and standard deviation.

Figure 1: The adjusted volume/height ratios are represented by bar length, with their numerical representation attached. There were 9 subjects in each group. *PSGC: pressure-sensitive gastric calibration.*



Results

40 Fr bougie		PSGC Tube	
Mean	9.62	Mean	12.78
Standard Error	0.66	Standard Error	0.60
Median	9.74	Median	12.13
Standard Deviation	1.99	Standard Deviation	1.80
Sample Variance	3.97	Sample Variance	3.24
Kurtosis	0.19	Kurtosis	0.67
Skewness	0.56	Skewness	0.70
Range	6.38	Range	6.10
Minimum	7.03	Minimum	10.18
Maximum	13.41	Maximum	16.28
Sum	86.61	Sum	115.01
Count	9	Count	9

Table 1: Summary of measurements and basic calculations. *PSGC: pressure-sensitive gastric calibration, Fr: French*

	40 Fr bougie		PSGC tube	
	Adjusted volume/height ratios	IQR	Adjusted volume/height ratios	IQR
Operator 1	7.56	3.01	12.13	2.35
	13.41		16.28	
	9.74		14.19	
Operator 2	10.96		13.77	
	7.03		10.18	
	8.06		13.22	
Operator 3	8.86		11.97	
	10.32		11.72	
	10.68		11.55	

Table 2: Pressure-adjusted volume/height ratios, interquartile ranges (IQR). *PSGC: pressure-sensitive gastric calibration.*

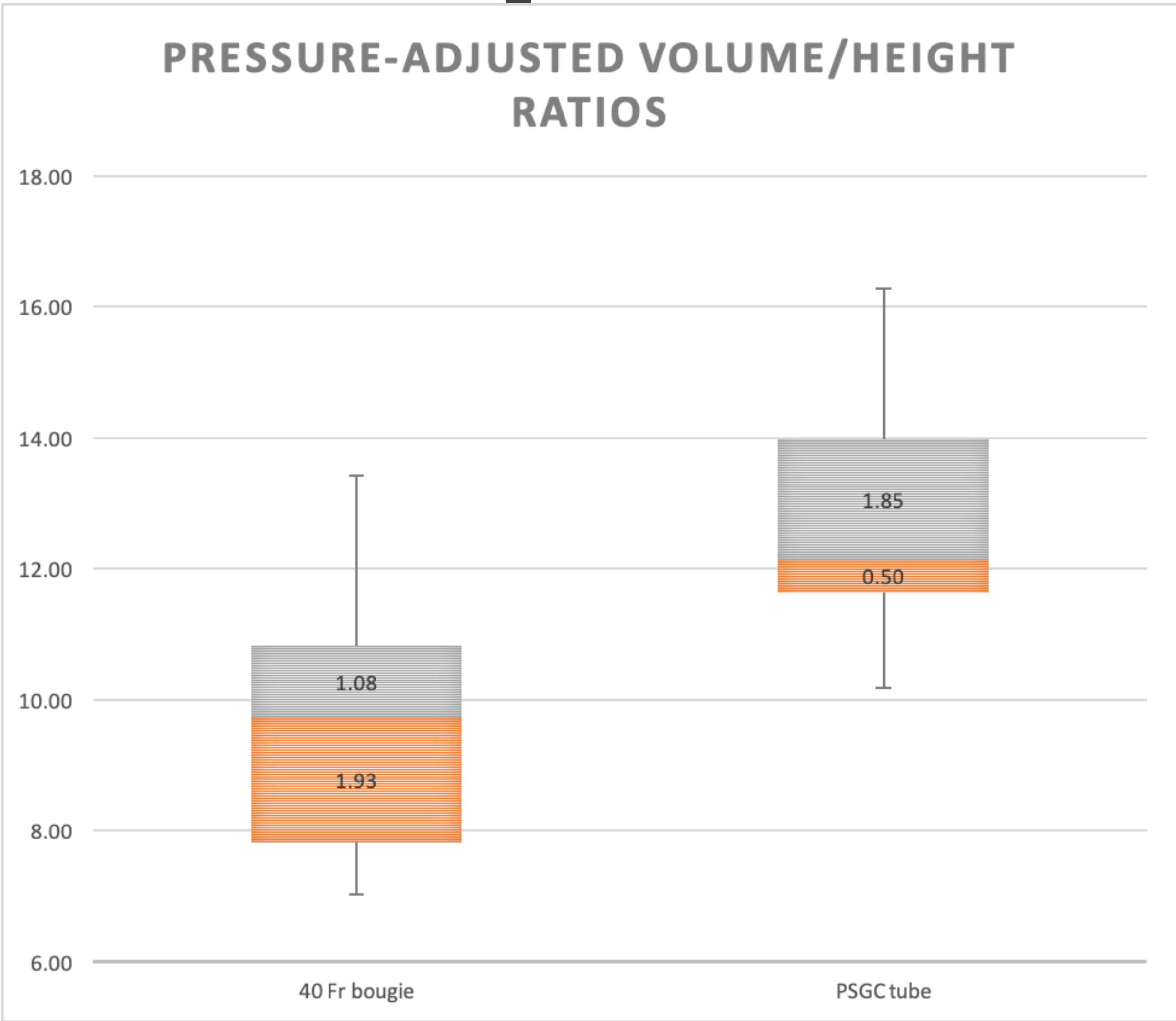


Figure 2: Box and whisker plot of the adjusted volume/height ratios. Narrower distribution of the PSGC tube cohort in comparison to that of the 40 Fr bougie suggests greater consistency. *PSGC: pressure-sensitive gastric calibration.*

Table 3: Test of variance. F-test shows $p=0.0013$ when measurements from Operator 3 considered alone. *PSGC: pressure-sensitive gastric calibration, Fr: French, df: degrees of freedom, F: F-statistic, P: P-value*

Conclusions

- All measures of variation among the pressure and height-adjusted volumes favored the PSGC tube. However, the only statistically significant measure by F-test with an alpha of 0.05, was the comparison of the intra-operator variances for Operator 3.
- The PSGC tube produced gastric sleeves with volumes greater than those desired: future designs will incorporate a smaller balloon.
- Sleeve gastrectomy performed with the PSGC tube had improved consistency over that using the 40 Fr bougie by standard measures of variation; additional testing is warranted to further characterize the significance of this difference.

F-Test Two-Sample for Variances: Inter-operator		
	40 Fr bougie	PSGC tube
Mean	9.62	12.78
Variance	3.97	3.24
Observations	9	9
df	8	8
F	1.23	
P(F<=f) one-tail	0.39	
F Critical one-tail	3.44	
F-Test Two-Sample for Variances: Operator 1		
	40 Fr bougie	PSGC tube
Mean	10.24	14.20
Variance	8.75	4.30
Observations	3	3
df	2	2
F	2.03	
P(F<=f) one-tail	0.33	
F Critical one-tail	19	
F-Test Two-Sample for Variances: Operator 2		
	40 Fr bougie	PSGC tube
Mean	8.68	12.39
Variance	4.15	3.74
Observations	3	3
df	2	2
F	1.11	
P(F<=f) one-tail	0.47	
F Critical one-tail	19	
F-Test Two-Sample for Variances: Operator 3		
	40 Fr bougie	PSGC tube
Mean	9.95	11.74
Variance	0.93	0.044
Observations	3	3
df	2	2
F	21.07	
P(F<=f) one-tail	0.045	
F Critical one-tail	19	