Detection of arterial pulsations and their smallest diameter compared between conventional grasper and two types of haptic feedback instruments

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Two studies have been done to investigate the effects of haptic feedback on the ability to detect arterial pulsations

A. Optigrip, Optitouch and a **conventional grasper** were compared in an artificial artery setup with different artificial artery diameters.
Participants were OR staff, medical students, residents and surgeons (N=22)

B. Optigrip and Optitouch were tested in a POP simulator with a pulsating porcine model to compare.
Participants were experienced surgeons (N=8).

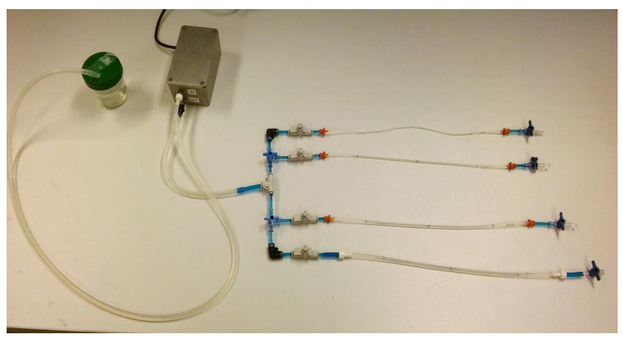
HAPTIC FEEDBACK INSTRUMENTS USED:
- ❑ **Optitouch** has been developed to register pulsating structures, the mechanical design has been optimized to reduce intrinsic friction.
- ❑ **Optigrip** is a realtime haptic feedback device, giving the real touch of tissue including pulsations.

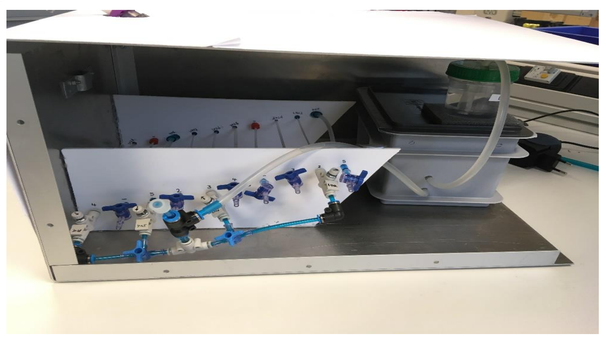
STUDY A:

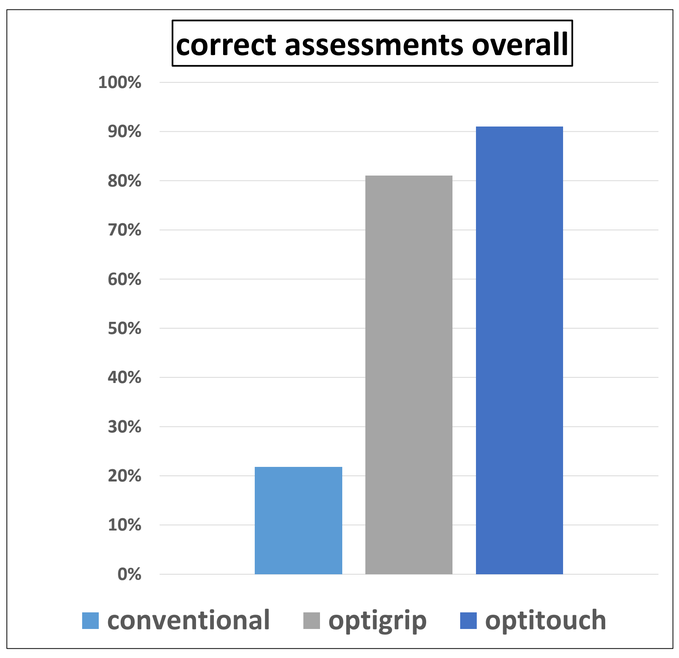
Size categories of silicon tubes used for testing.

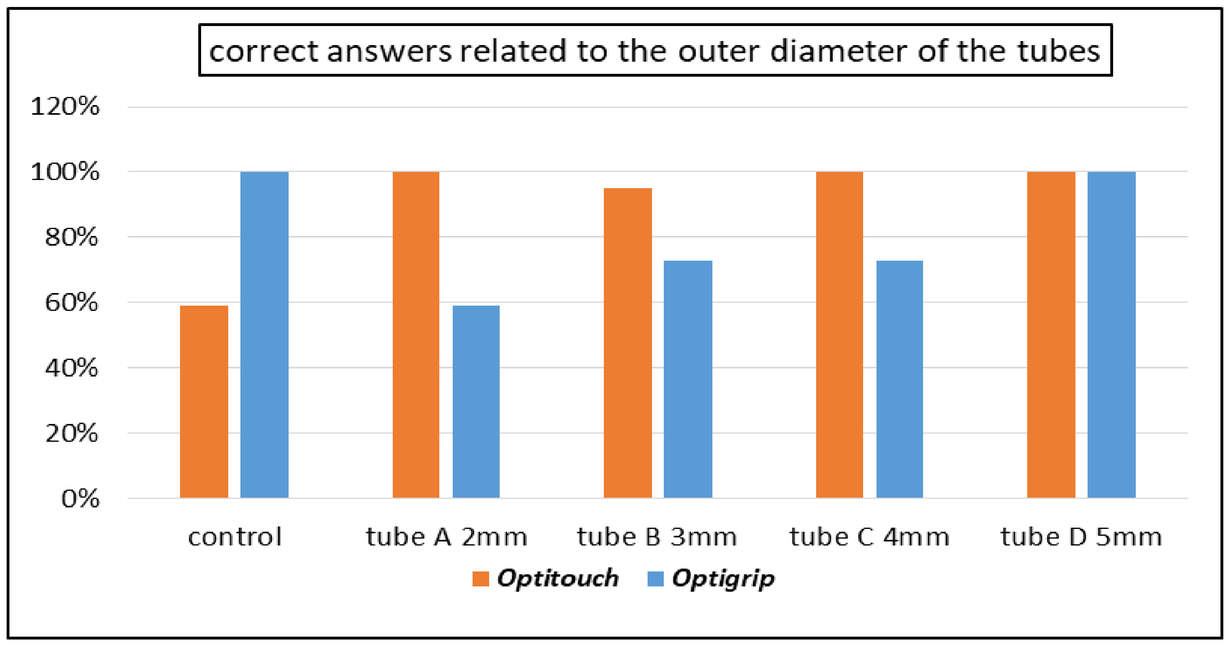
Category	Inner diameter	Outer diameter	Wall thickness
A	1.4	2	0.3
B	2	2.6	0.3
C	3	3.8	0.4
D	4	5	0.5
E	2	2.6	0.3

Study set up with the artificial arteries



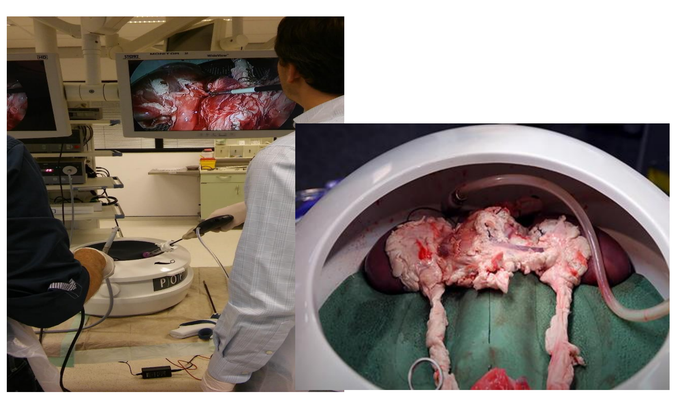




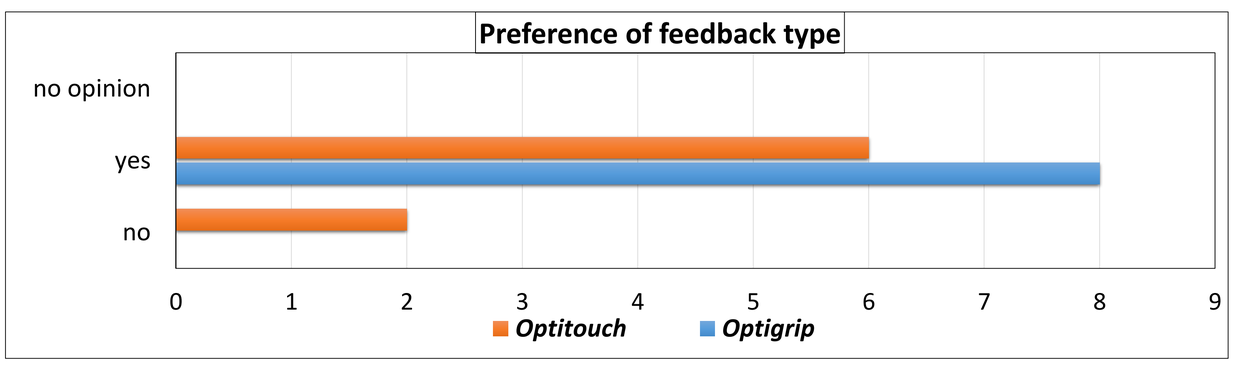


STUDY B:

Study set up with POP simulator
To detect the renal arteries and the ureter

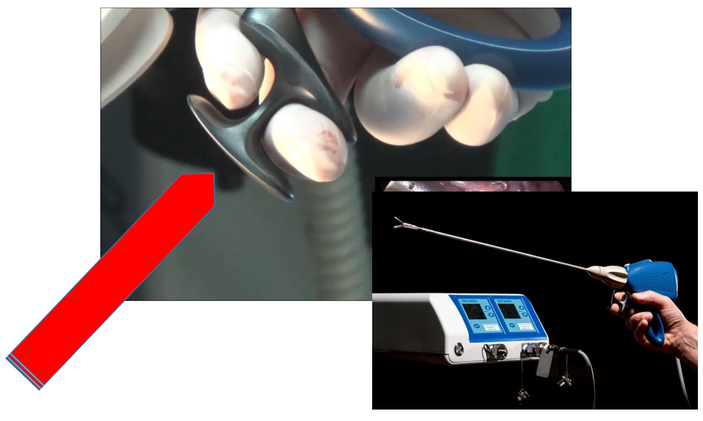


the pulsations could be felt by both instruments but the feedback of the Optigrip is more appreciated by the direct haptic feedback (dynamic) compared to the Optigrip (tactile)

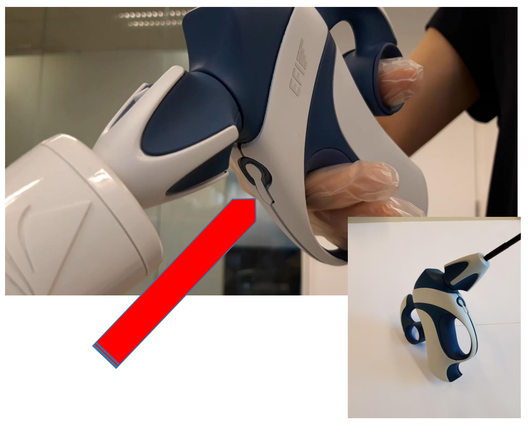


	Optigrip	Optitouch
Pulsation felt	**8**	**8**
time to find pulsaties(sec)	**65±41**	**60±39**

Optigrip®



Optitouch



Conclusions :

Both the Optigrip and Optitouch can clearly feel pulsations, while the conventional tool cannot feel pulsations. The Optitouch is more sensitive to pulsations in smaller diameter tubes than the Optigrip in the artificial set up. The Optitouch needs to be further optimized to decrease the number of false positives. The direct feedback in the gripper of the Optigrip is more appreciated compared to the pulsating pin of the Optitouch. This difference in the way of creating the feedback between both instruments which might result in different application areas.

COI: Vleugels is patent holder of haptic feedback technologies