

A Novel Sensorised Device to Improve Safety and Training In Operative Birth

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Background

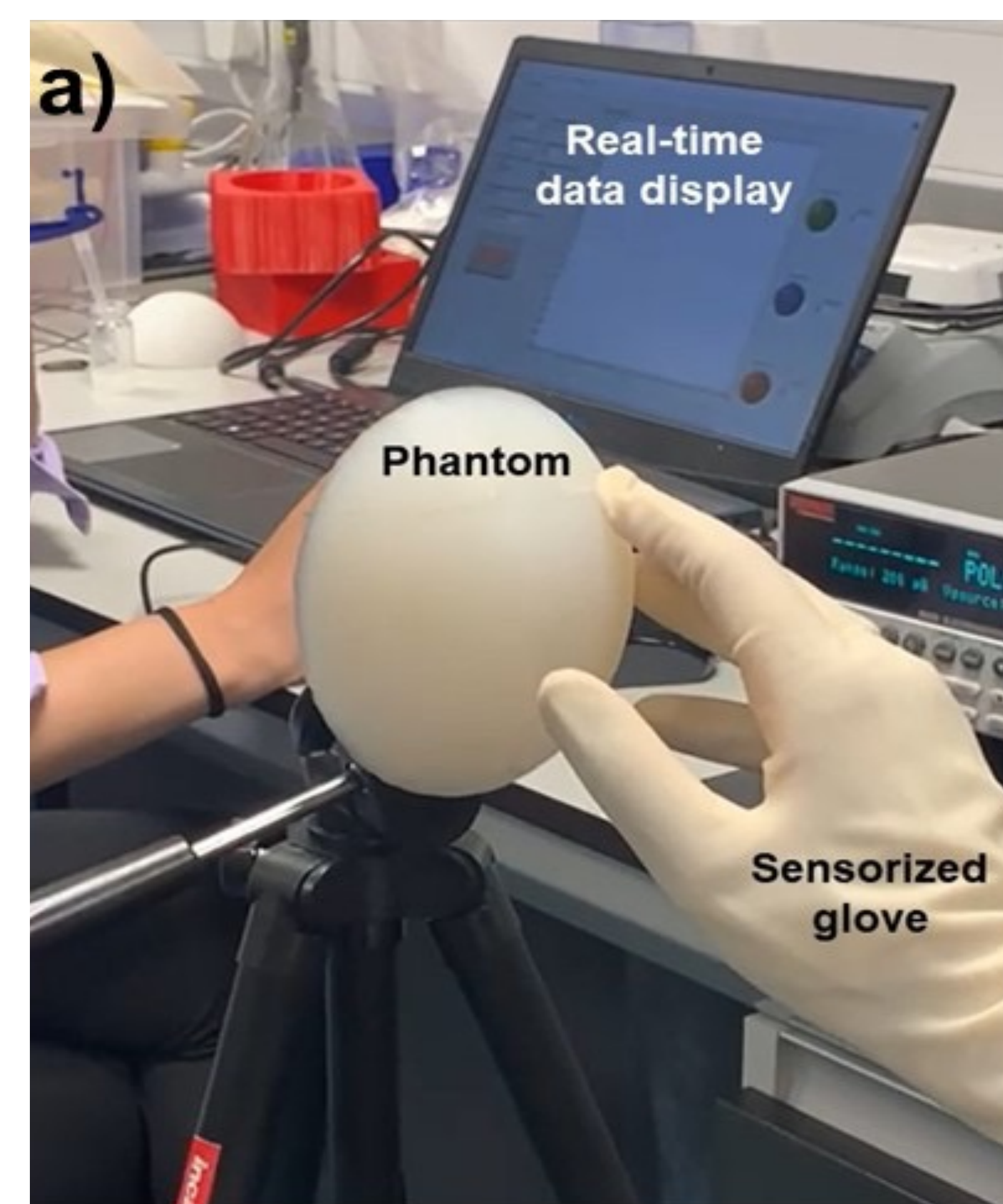
- Vaginal examination in labour **subjective**
- Operative vaginal birth injuries **highly litigated**
- Instrument placement **suboptimal (30%)**
- Operative vaginal birth success **decreasing**

Objectives

- Develop **sensorised, wearable** device for digital vaginal examination
- Facilitate **accurate** assessment of fetal position
- Measure **force** exerted on fetal head during vaginal examination & birth

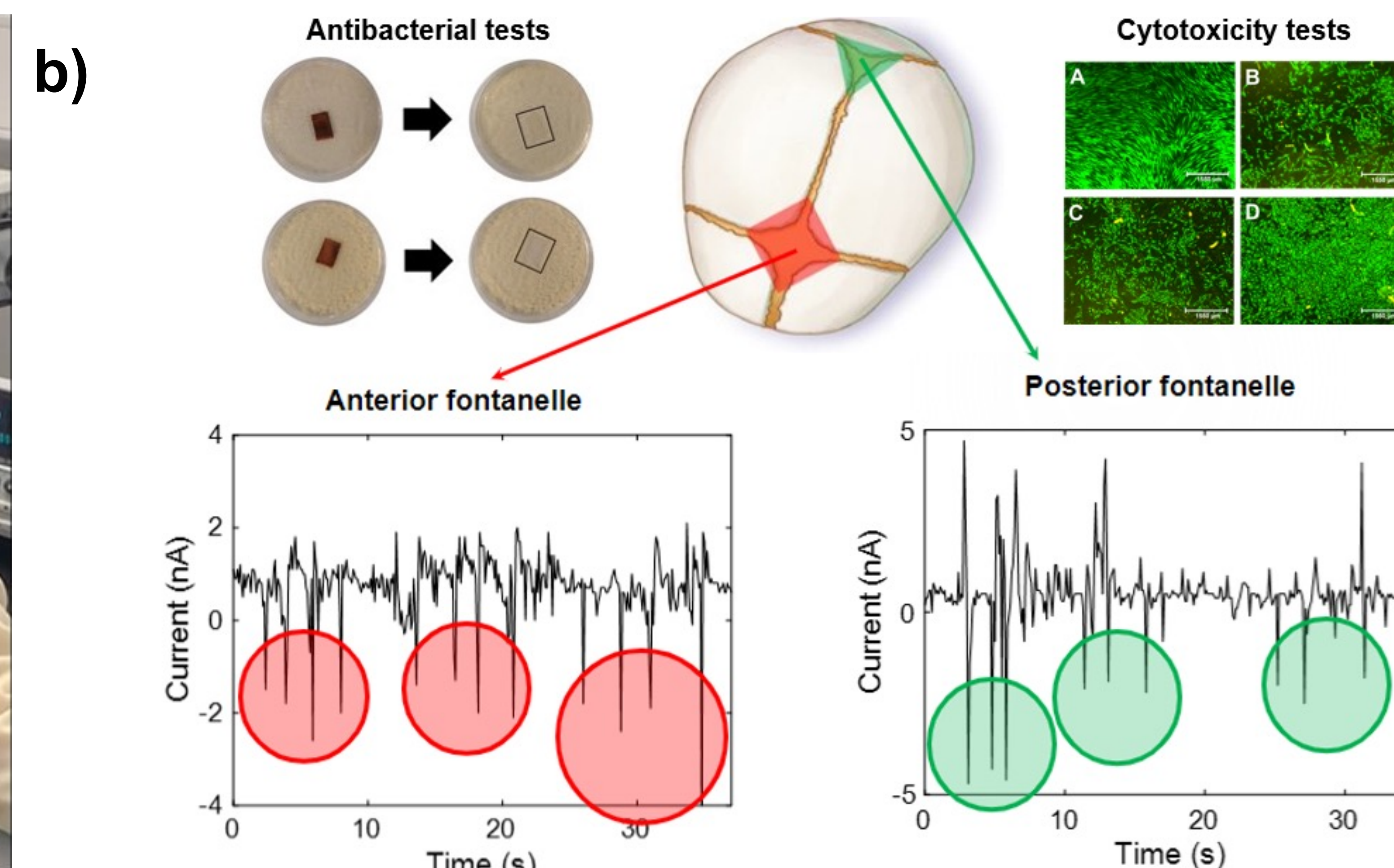
Methods

- Flexible pressure/force sensors mounted on fingertips of surgical glove
- Sensors calibrated 10 micro-metre step size (min distance that can be recorded) 0.0088 Newton (N) sensitivity
- Detects force applied change in stiffness of the fetal scalp when crossing a suture
- Obstetricians tested the device mock vaginal examination at full dilatation (Figure a) on neonatal phantoms
- Data recorded & signals interpreted
- Patient & public involvement (PPI) panel advised design & functionality



Results

- Accurate detection of fetal sutures on neonatal phantoms (Figure b)
- Quantitative force readings 45 N force range 0.1 N sensitivity
- Software developed - alerts clinician when excessive force applied & displays fetal position



Conclusion

- Novel device – used with phantoms **accurately** detects fetal sutures provides real time **force** readings
- Antibacterial & cytotoxicity** tests support clinical translation (Fig b)
- Next: **Real-life study** of labouring women & neonates