

3D AUGMENTED-REALITY ROBOT-ASSISTED RADICAL PROSTATECTOMY: A RADIOLOGICAL AND PATHOLOGICAL STUDY



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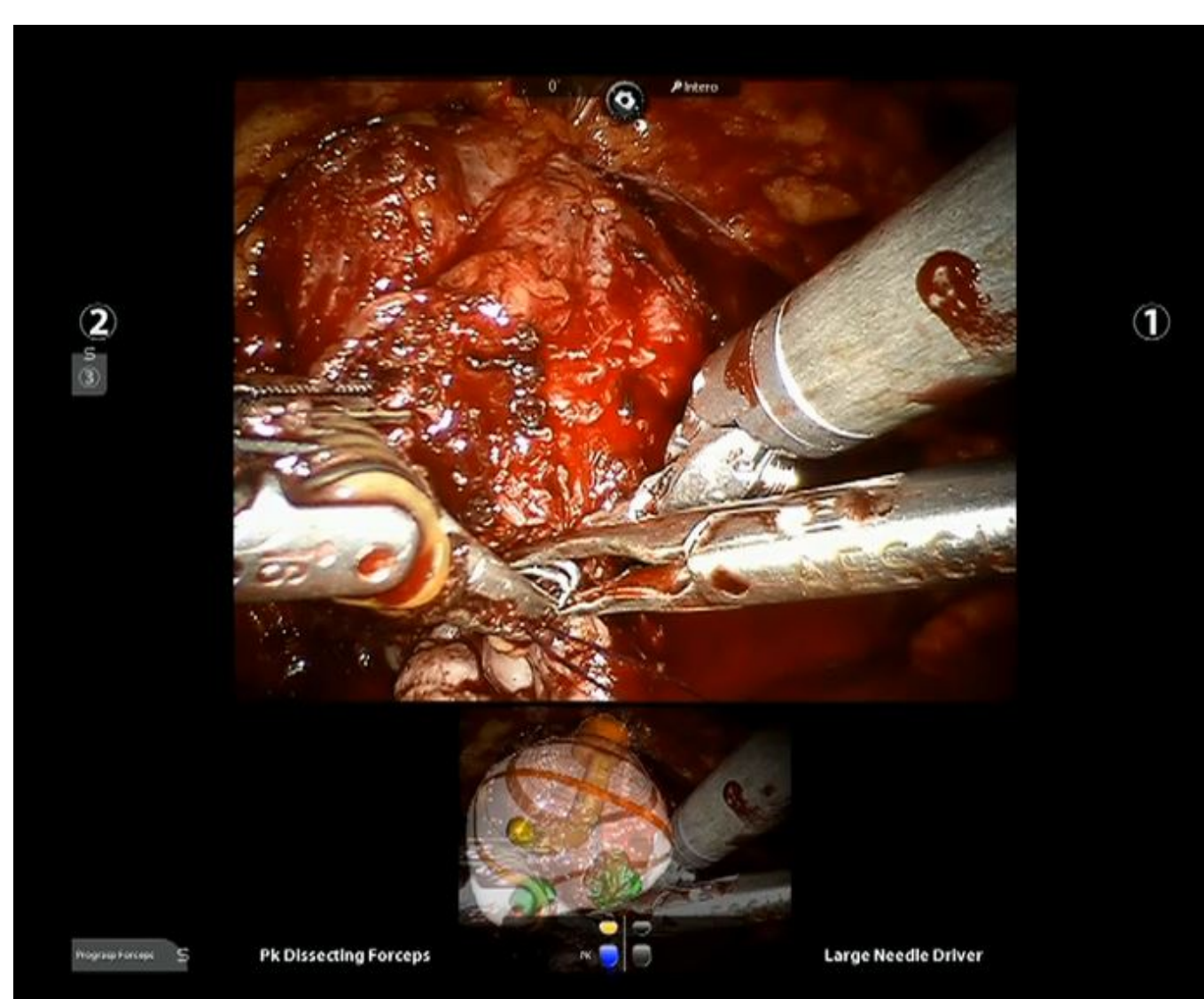
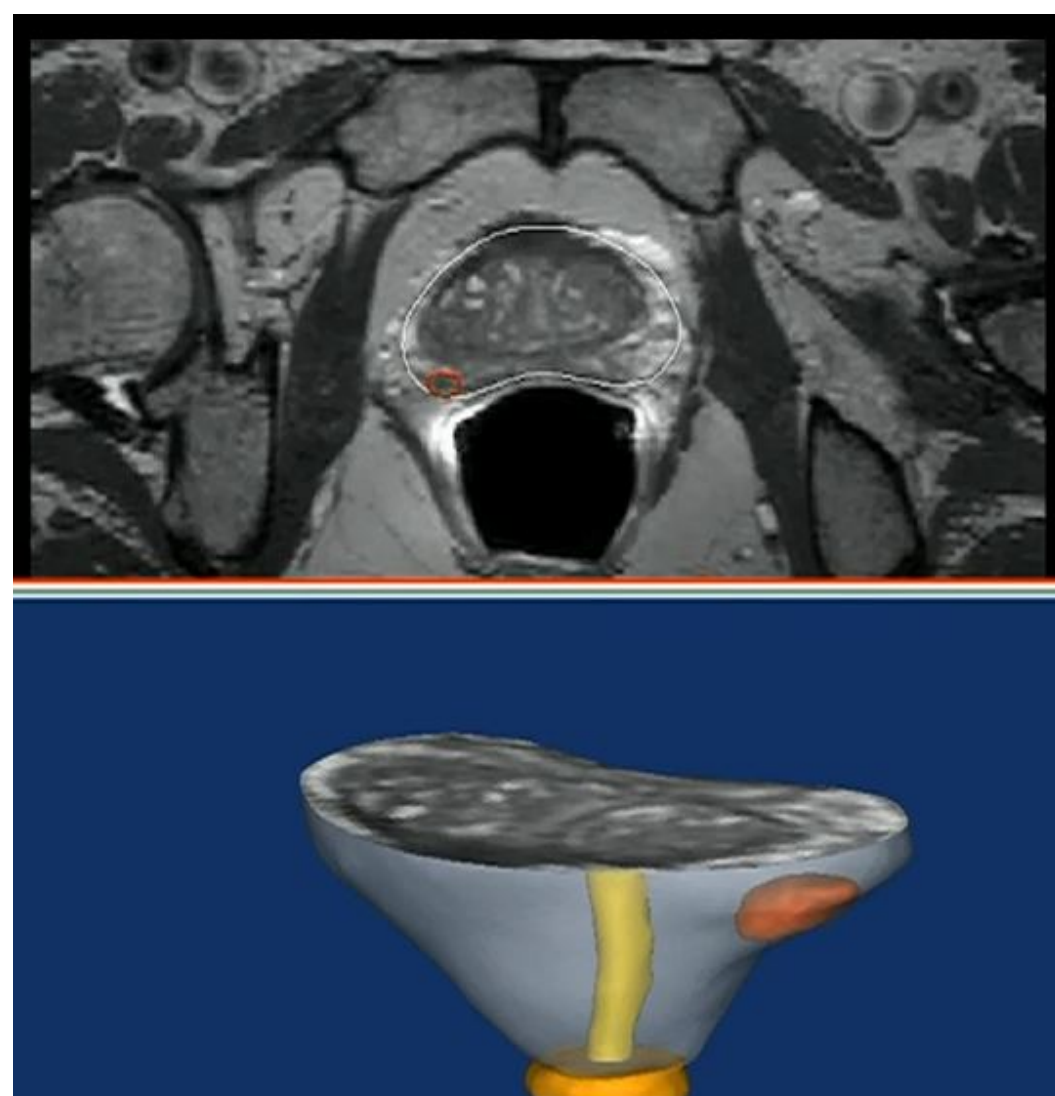
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AIM OF THE STUDY:

- Nowadays, in **prostate cancer surgical procedures, oncological and functional outcomes are equally important.**
- The improvement of new technologies and minimally invasive surgery translated into a more **tailored approach.**
- In this setting, the **3D rendering and the intraoperative surgical navigation** allow to overcome the limitation of this «building in mind» process.
- Aim of this study is to present our preliminary experience with augmented reality robot-assisted radical prostatectomy (AR-RARP).

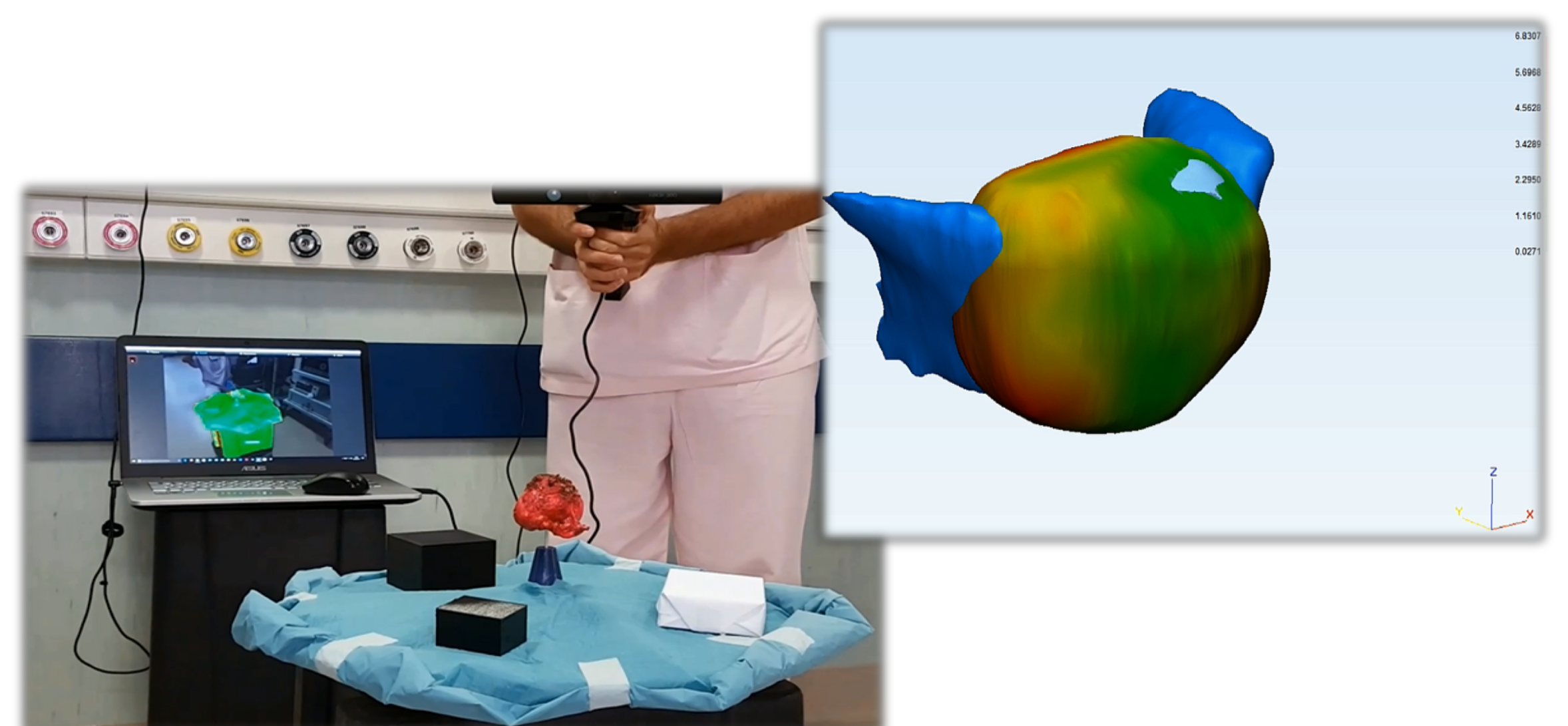
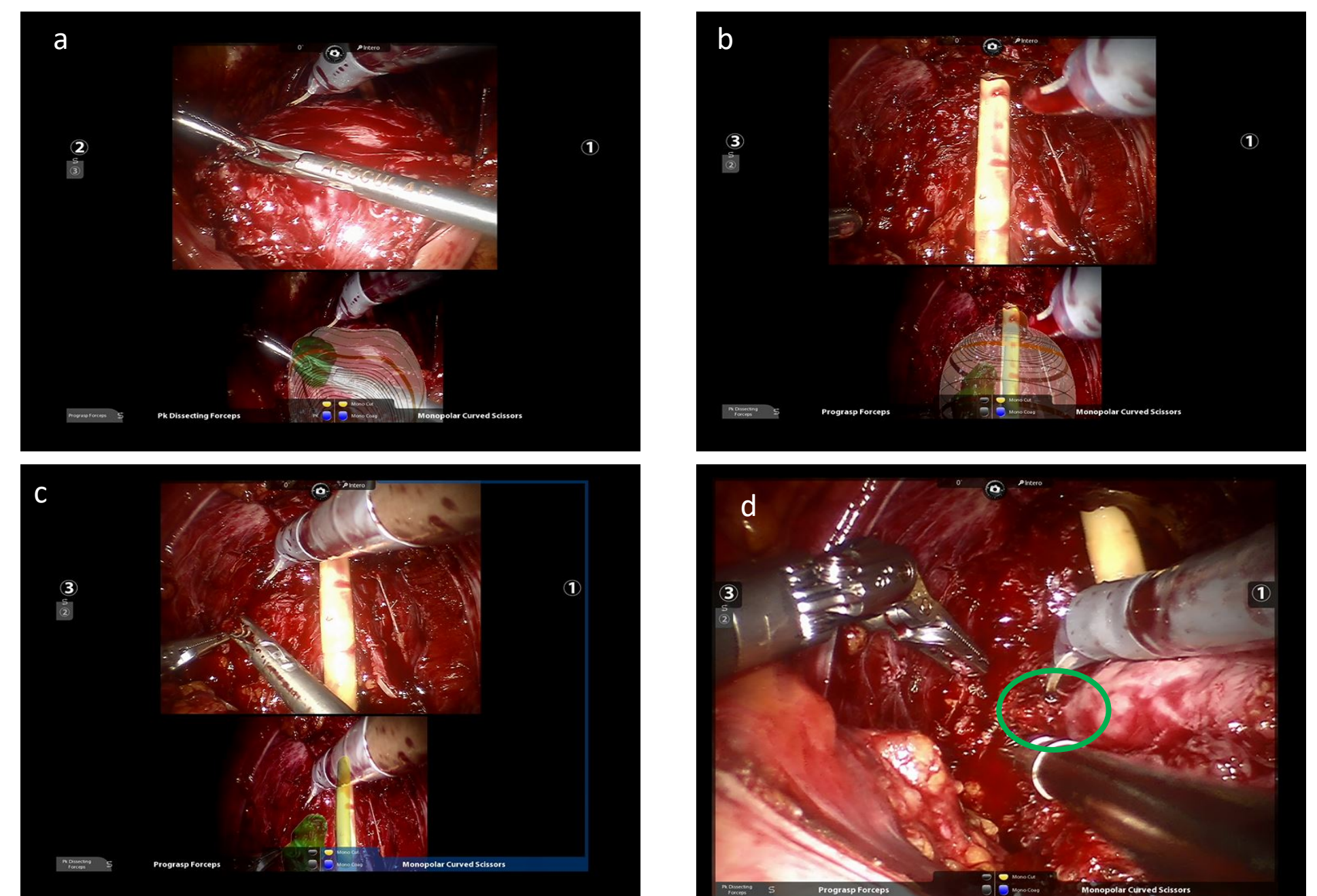
MATERIALS AND METHODS :

- According to dedicated protocol, from June 2017 to March 2018 patients candidate to RARP were enrolled and underwent **high resolution (1-mm slices) multiparametric Magnetic Resonance (mpMRI)**.
- **3D reconstruction obtained was integrated in the robotic console to perform AR-RARP** (Fig.1).
- According to the MRI-reconstruction staging:
 - *patients with cT2 PCa*, underwent *intrafascial nerve sparing (NS)* -> **a mark was placed at prostate capsule** to indicate the underlying intraprostatic lesion;
 - in case of *cT3*, *standard NS AR-RARP* was scheduled -> **AR-guided biopsies at the level of suspected extracapsular extension (ECE)** were performed.
- Prostate specimens were scanned to assess the 3D model concordance.



RESULTS:

- **25 patients underwent intrafascial NS technique (cT2)**
- **25 underwent standard NS + selective biopsy of suspected ECE (cT3).**
- Final pathology confirmed clinical staging.
- **Positive surgical margins rate was 27% overall and 4.2% in pT2.**
- The **location of marked intra-prostatic lesions were confirmed at final pathology in all the cases** (Fig. 2).
- In suspected ECE, **AR-guided selective biopsies confirmed the ECE location, with 20/25 (80%) positive biopsies for Pca** (Fig. 3).
- Prostate specimens were scanned finding a good overlap. The mismatch between 3D reconstruction and scanning ranged from 1 to 5 mm. In the 85% of the entire surface it was < 3 mm (Fig 4).



CONCLUSIONS:

- In our preliminary experience, **AR-RARP is safe and effective.**
- **The accuracy of 3D reconstruction seemed to be promising.**
- This technology has still limits: the virtual models are rigid and they need manually orientation.
- Future collaborations with bioengineers are mandatory to overcoming.