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ORIGINAL ARTICLE

Da Vinci robot emergency undocking protocol

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Abstract The role of robot-assisted surgery across gynaecology is evolving with increasing numbers of procedures being undertaken with varying degrees of complexity. While the risk of conversion is low at approximately 1 %, the reasons for conversion are variable. These range from technical issues with the robot, surgical complications such as haemorrhage and anaesthetics issues such as an inability to ventilate the patient adequately. While many conversions to open or laparoscopic approach are not due to life-threatening indications, it is important that the theatre staff are aware of the indication and can perform an emergency undocking as effectively, efficiently and safely as possible when the need arises. Unfortunately, there is a paucity of the literature available outlining such protocols. For this reason, we developed an emergency undocking protocol clearly outlining the role of each theatre staff member and the need for clear concise communication.

Keywords Emergency · Undocking · Protocol · Patient safety

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Introduction

A 53-year-old, para 2^{+2} was admitted for a robot-assisted sacrocolpopexy for treatment of a grade 3 vaginal vault prolapse which occurred following a vaginal hysterectomy and pelvic floor repair. Her previous surgical history includes an open appendectomy, a laparoscopic cholecystectomy, arthroscopy of left knee and repair of an incisional hernia. From a medical point of view she has hypertension for which she was on cetrizine 10 mg and rasilez 150 mg daily. She weighed 96 kg.

She underwent pre-operative assessment by the anaesthetists and was deemed suitable for surgery. She had a general anaesthetic and the robotic cannulas were placed. She was then positioned in moderate Trendelenburg and the robot was docked. Intraoperatively she developed anaesthetic and respiratory complications, she had a decreased SP02 and increased airway pressure. Due to these anaesthetic concerns the procedure required conversion to an open sacrocolpopexy. This required emergency undocking. To undock the robot, first the surgeon ensured the instruments were all in view, and then the first assistant removed the instruments and the endoscope. Next the instrument and camera arms were disconnected from the cannulas and the arms folded away ready for the patient cart to be removed from the surgical field. During this time the surgeon scrubbed and prepared for the surgery. The second assistant unscrubbed and called for help. In this instance, we required a second consultant anaesthetist and the portering staff to reposition the patient. From a nursing point of view, the anaesthetic nurse assisted the anaesthetist, while the circulating nurse moved the patient cart, stored it safely and proceeded to get the open instruments for the scrub nurse who has remained scrubbed throughout the emergency undocking and assisted the second assistant.

Following the emergency undocking the patient stabilized, her SP02 increased and her airway pressure returned to normal, thus allowing the procedure to be completed safely with no complications as an open procedure. Post-operatively she made a good recovery, however, she required a longer length of stay in hospital and had an increased analgesic requirement.

Discussion

A recent systematic review of robot-assisted sacrocolpopexy reported a rate of conversion of 1 % [1] with a range of 0–8.6 % depending on the centre. The indications for conversion vary from anaesthetic, surgical and technical causes. The majority of conversions was open; however, 21 % were converted to the laparoscopic approach. Conversions are relatively uncommon but with a potentially life-threatening indication where timely and effective emergency undocking may be lifesaving, it is mandatory that all hospital workers dealing with robotics be familiar with the local emergency undocking protocol. Communication must be clear and concise as the conversion may be to either laparoscopic or the open approach with different requirements for both. Conversion requires a number of steps be undertaken simultaneous with the potential for people double jobbing unless everybody's role is clear. Therefore, as with all emergencies familiarity with the protocol and procedure is important. With this in mind we developed a clear concise protocol for emergency undocking and conversion. It was developed by the robotic surgeons, with input from anaesthetists, nursing and portering staff. All staff working in the operating complex were given a copy of the protocol to update themselves and laminated copies are placed in the theatre and anaesthetic room so staff can familiarize themselves with it at regular intervals. We know from ACLS, ATLS and other simulation training courses that this type of training benefits patient outcomes [2]. Providing staff with a safe environment to familiarize themselves with the approved protocol and their role via simulation improves performance and efficiency during an emergency [3]. Clear, concise communication has benefits for the patients and staff in surgical theatres [4]; furthermore, communication is paramount during surgical emergencies [5]. In addition Marr concluded that high-stress situations simulated in a low-stress environment could improve team interaction and educational competencies.

Developing the emergency undocking protocol has provided a document that clearly and concisely allows individuals to know what their specific task is during the emergency undocking procedure, it emphasizes the need for clear communication and should improve the team efficiency. We would recommend instigating a policy for regular emergency undocking skills and drills to enhance the team performance and ultimately patient safety.

The protocol for emergency undocking of the da Vinci robot at Cork University Maternity Hospital

Healthcare professionals working in the theatre complex must be aware of the indications for conversion of robot-assisted surgery to either open or laparoscopic approach. These would include:

- Requirement for emergency laparotomy (e.g. massive haemorrhage)
- Cardiac/respiratory arrest
- Anaesthetic concerns
- Technical issues with robot.

When working with the da Vinci robot it is mandatory at ALL times that all members of the team (Doctors/Nurses/Porters) ensure the following occurs:

- Clear communication between all members of the robotic surgery team.
- Clear understanding of each member on the teams' role.
- Who is in the team—anaesthetics, surgeons, nurses, and porters.
- Awareness of all team members of trigger words.
- Trigger word—***EMERGENCY UNDOCK*** including the indication either anaesthetic or surgical.
- Clearly identify the indication for emergency undocking e.g. ***HAEMORRHAGE or RESPIRATORY ARREST***.
- Clearly state if for laparotomy/laparoscopy to have instruments available.
- Each team member must be fully aware of his or her role in the protocol.

Once the protocol has been activated the following sequence of events occurs, many happening in tandem.

Console surgeon:	Ensures the instruments are safely placed in the centre of the operative field—ready for removal. Then gowns and gloves in preparation for the laparotomy/laparoscopy.

1st Assistant (bedside):	Removes the instruments and the endoscope from the patient. Disconnects the cannulas from the instrument ARMS and the camera arm. In case of emergency conversion—remove the cannulas while attached to the surgical arms (this is done by pressing the clutch button located on the robotic ARMS). Fold the ARMS, ready to move the patient cart away from the patient. Remove the cannulas—begin laparotomy, in the event of conversion to laparoscopy the cannulas remain in situ—begin laparoscopy.
2nd Assistant (bedside):	Unscrubs and calls for help (call for porters/alerts laboratory/ anaesthetics).
Scrub nurse:	Remains scrubbed and gets instruments required (laparoscopic/open).
Circulating nurse:	Moves the patient cart from the patient's side and safely stores it away from the surgical table.
Anaesthetic/3rd nurse:	Assists the anaesthetists.

Compliance with ethical standards

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Conflict of interest O. E. O'Sullivan has received educational bursaries from Pfizer Ireland and Astellas. S. O'Sullivan has received educational bursaries from Pfizer Ireland and Astellas. M. Hewitt has acted as a mentor/proctor for intuitive surgical. B. A. O'Reilly has acted as a mentor/proctor for intuitive surgical. He has received educational grants from Pfizer Ireland and Astellas.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent Informed consent was obtained from the patient included in this paper.

References

1. Serati M et al (2014) Robot-assisted sacrocolpopexy for pelvic organ prolapse: a systematic review and meta-analysis of comparative studies. Eur Urol 66(2):303–318
2. Cox T, Seymour N, Stefanidis D (2015) Moving the needle: simulation's impact on patient outcomes. Surg Clin N Am 95(4):827–838
3. Georgiou A, Lockey DJ (2010) The performance and assessment of hospital trauma teams. Scand J Trauma Resusc Emerg Med 18:66
4. Seagull FJ, Moses GR, Park AE (2008) Pillars of a smart, safe operating room, in advances in patient safety: new directions and alternative approaches (Vol. 3: performance and tools), Henriksen K et al., Editors. Rockville MD
5. Marr M et al (2012) Team play in surgical education: a simulation-based study. J Surg Educ 69(1):63–69