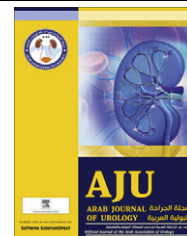




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REVIEW

The development of robotic surgery in the Middle East

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KEYWORDS

Robotic surgery;
Da Vinci;
KSA;
Prostatectomy;
Robotics

ABBREVIATIONS

FDA, USA Food and Drug Administration;
KSA, Kingdom of Saudi Arabia; QRSC, Qatar Robotic Surgery Centre; RARP, robotic-assisted radical prostatectomy; ARM, anorectal malformation

Abstract Objectives: We provide an overview of the development of robotic surgery in the Middle East since its first introduction in April 2003 in the Kingdom of Saudi Arabia (KSA).

Methods: We searched MEDLINE using 20 keywords/phrases and identified 44 reports, of which only 15 were relevant. Five of these articles were duplicated when using two different keywords. Therefore, no more than 10 articles were found that were relevant to the scope of this review.

Results: After completing the MEDLINE search to identify articles related to robotic surgery in the Middle East, we noted that all of the nine case series (Level of evidence 3a) reported took place in the KSA, with no other reported series from other Middle-Eastern countries. To the best of our knowledge, there are no operating robotic surgery systems (da Vinci, Intuitive Surgical, CA, USA) in the Middle East other than in the KSA, Qatar and Egypt. The number of robotic surgery cases and newly adapted robotic procedures is increasing. Two major institutions in the KSA have expanded to robotic-assisted pyeloplasty in all of their cases since January 2005.

Conclusion: There are 10 da Vinci robots in the KSA, with over 35 trained surgeons, yet very few index cases. The cancer incidence rate, lack of practitioners' referrals, and demographic age distribution are all factors that contribute significantly to the few index cases reported. By consolidating the robotic surgery procedures in high-volume speciality centres, hospitals can increase their case loads by promoting the multidisciplinary use of the robotic system. Even though growth is

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relatively slow, we believe that robotic surgery is gaining momentum, and its benefits and innovation will soon be grasped in other countries in the Middle East.

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Introduction

The use of robotic-assisted surgery has grown exponentially over the past decade. It has revolutionised minimally invasive techniques for many surgical procedures worldwide, and has been adopted rapidly over the past 4 years in both the USA and Europe [1]. The da Vinci robotic system (Intuitive Surgical, Sunnyvale, CA, USA) is the only surgical system that was approved for general laparoscopic surgery by the USA Food and Drug Administration (FDA) in 2000, and the only system to have received approval for cutting and suturing [2]. It was approved for prostatectomy procedures in 2001, for urological surgical procedures in March 2005, for gynaecology in April 2005 and paediatric surgery in June 2005 [3]. The major beneficial features of robotic-assisted surgery over standard laparoscopy include an articulating wrist with seven degrees of freedom, a three-dimensional camera system with up to $\times 15$ magnification, elimination of surgeon's tremor and improved surgeon's ergonomics. As such, robotic-assisted surgical techniques will enable the surgeon to achieve more precise surgery and better performance for specific operations [2]. All these factors combined with well-trained surgeons at a highly experienced centre can improve patient outcomes. These positive outcomes include a shorter hospital stay and decreased intraoperative estimated blood loss [2].

The USA market is the leader in robotic applications, with the global market a few years behind in the adoption cycle [4]. By the end of 2010, the number of robot-assisted procedures that are performed worldwide has grown by $\times \approx 347\%$ since 2007, from 80 000 to 278 000 [1,3]. Of those procedures, Intuitive Surgical estimated that $\times \approx 110\,000$ were hysterectomy procedures and $\times \approx 98\,000$ were prostatectomy procedures, according to the Intuitive Surgical 2010 annual report [3]. Other procedures have shown significant growth in urology and gynaecology, such as partial nephrectomy and sacrocolpopexy, respectively [3].

Worldwide, between 2009 and 2010, the number of da Vinci systems that were installed in major hospitals

increased by $\times \approx 30\%$, from almost 338 to 441 [3]. Currently, 1840 units have been sold and installed in over 1450 hospitals worldwide [5].

In the Middle East, robotic surgery was first introduced in the Kingdom of Saudi Arabia (KSA) in 2003. At present there are 10 da Vinci robotic systems installed in eight major hospitals across the KSA. In 2010, Qatar founded the new Qatar Robotic Surgery Centre (QRSC), acquiring three da Vinci robots. To the best of our knowledge, there are no operating da Vinci robots in the Middle East other than the KSA, Qatar, and Egypt. A search of previous reports identified nine reported case series, all of which took place in the KSA, with no other reported series from other Middle-Eastern countries.

Methods

We searched MEDLINE using keywords such as 'robotic surgery' with a country name added (Saudi Arabia, Lebanon, Egypt, Qatar, United Arab Emirates, Dubai, Kuwait, Bahrain, Tunisia, Oman). The search identified only 10 articles that were relevant (Fig. 1, Table 1), nine of which were case-report series from different institutions in Saudi Arabia, and one that explored the role of media coverage and marketing of robotic-assisted radical prostatectomy on the Internet. The remaining information in this review was acquired from the operative records collected by the da Vinci system local distributor.

Robotic surgery in the KSA

The first da Vinci system was installed in 2003 (Fig. 2); currently there are 10 robotic systems installed in the KSA of which six are distributed amongst four major hospitals in the capital city of Riyadh. Two are installed in different hospitals in the eastern province and two are installed in different hospitals in the western region.

According to the da Vinci data, there are over 35 medical doctors in KSA trained to work with the da Vinci surgical systems in the following fields; 12 in urology, eight in gynaecology, 10 in general surgery, three in thoracic and two in ear, nose and throat.

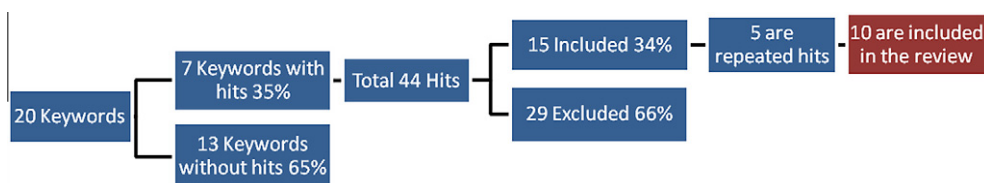


Figure 1 The MEDLINE search diagram depicting the number of hits and the number of reports included.

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