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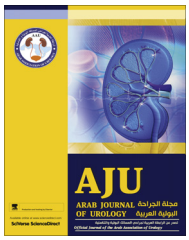

REVIEW

Training in ureteroscopy for urolithiasis

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KEYWORDS

Lithotripsy;
Learning curve;
Training;
Ureteroscopy;
Urolithiasis

ABBREVIATIONS

GRS, global rating scale;
OCEBM, Oxford Centre for Evidence-Based Medicine;
TCT, task completion time;
(f)URS, (flexibe) ureteroscopy;
VR, virtual reality;
RCT, randomised controlled trial

Abstract ***Objectives:*** To provide an insight into the current status of semi-rigid and flexible ureteroscopy, following new curricula for training methods, including training with models, virtual reality and active mentoring.

Methods: We systematically reviewed previous reports, including articles in English identified using the following strategy: ('ureteroscopy'[Mesh]) or ('urolithiasis'[Mesh]) AND ('education'[Mesh]), or ('teaching'[Mesh]). Abstracts submitted at congresses were not included. Relevant articles that were identified as references in the retrieved articles were also included.

Results: The terms ('urolithiasis'[Mesh] AND 'education'[Mesh]) retrieved 106 articles, of which five were included. The terms ('urolithiasis'[Mesh] AND 'teaching'[Mesh]) retrieved six articles, of which three were included. The terms ('ureteroscopy'[Mesh] AND 'education'[Mesh]) retrieved 29 articles, of which 21 were included. The terms ('ureteroscopy'[Mesh] AND 'teaching'[Mesh]) retrieved eight articles, of which seven were included. Remaining articles were found in the reference section of retrieved articles. Finally, 43 articles were included. Four randomised controlled trials with level 1b evidence were included. Currently there is no standard teaching method for ureteroscopy and the number of cases to reach competence has not yet been defined. However, simulation-based training has been shown to be effective, cost-effective, and to increase patient safety.

Conclusions: Simulators lead to a more rapid acquisition of skills in ureteroscopy than do conventional training methods, and improve the performance of future surgeons. Flexible ureteroscopy simulators are a promising tool for training, and have

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the advantage of minimising the need for learning the procedures on patients. A didactic and clinical curriculum, including surgical videotape reviews as well as operative mentoring, enables a rapid progression in already experienced endourologists. However, there are few reports specifically addressing the skills necessary for training.

1. Introduction

The field of ureteroscopy (URS) has increased rapidly with the advent of innovative technologies. Flexible URS (fURS) has confirmed efficacy in the diagnosis and treatment of urolithiasis. The use of URS simulators could improve procedural skills before starting to operate on patients. With an increase in the expectation of a high-quality service by the public, and with the risk of litigation, it is desirable to acquire technical competence before undertaking procedures on patients as a first attempt [1]. Therefore, there is increased interest in simulating surgical operations, with the potential to shorten the initial learning curve without compromising patient safety [2]. The rapid development of new flexible ureteroscopes has led to a demand for physicians trained in these procedures. Surveys of urologists show a significant variation in training skills. fURS is an example of an effective procedure that is underused, due to the low distribution of cost-intensive equipment and maintenance, partly caused by inadequate training [3].

Reasons hampering the broad induction of fURS include the costs associated with disposable equipment [4], and the learning curve for fURS is another barrier to this approach [5].

The slow implementation of fURS might be related to a significant learning curve and the high procedural costs due to instrument failure caused by malpractice. To date there is no recommendation on the number of supervised fURS procedures for initial training or to maintain competency. There is currently no standard teaching method for fURS. Simulation-based training, when used for surgical and medical procedures, is effective, cost-effective, and increases patient safety.

Legal and ethical concerns about practising these procedures on a patient have become increasingly important. Therefore, a large part of the learning can be done by training on a model first, and does not require training on patients.

The objective of this review was to search for what types of ureterorenoscopic training models have been studied and how they were validated. The definitions of different forms of validity are given in Table 1 [6]. The results can be used as a guide for skills training in URS.

Methods

We systematically reviewed previous reports, identifying published articles in English using the following strategy: ('ureteroscopy'[Mesh]) or ('urolithiasis'[Mesh]) AND '(education'[Mesh]) or (teaching [Mesh]). Abstracts submitted at congresses were not included. Relevant articles found as references in retrieved articles were also included. Both authors reached a consensus about the inclusion and exclusion of articles. Abstracts submitted at congresses were not included.

Table 1 The definition of validity [6].

Type of validity	Definition
Construct	Ability to distinguish the experienced from the inexperienced surgeon (between groups) or for one surgeon over time.
Content	A judgement of the appropriateness of the simulator as a teaching method by experts. This addresses the question of whether the simulator realistically teaches what it is supposed to teach.
Criterion	Compares the evaluation results from the new simulator with those of the old technique or evaluation, to assess the degree of correlation.
	Concurrent
	Comparing a new with an old model by an objective structured assessment of technical skill
Predictive	Comparing model performance with operating room performance, using an objective structured assessment of technical skill
Face	Assessed informally by non-experts and relates to the realism of the simulator, i.e., does the simulator represent what it is supposed to represent?