Human cadaveric uro-oncology (HCU) surgical anatomy course: an "old" but contemporary training method

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ABSTRACT

Abstract:Purpose: We evaluated post-course trainees' satisfaction regarding to learning objectives, hands-on experience and increase overall knowledge of surgical oncological anatomy at the end of each theoretical and hands-on module with one year survey after the course.Materials and Methods: A total of 25 residents with their last year of residency were participants of this course.The course was given by faculty members of the Urology and Anatomy departments from various universities in our country.The procedures were defined by recommendations of the Turkish Board of Urology Training Program.At the end of each module evaluation of the course by the attendees included anatomy knowledge and surgical skills and were graded 1 to 4.A year telephone survey follow-up was conducted regarding progression report on their practices after the HCU course was given.At one year,the trainees were called to evaluate the efficacy of course (yes/no).Results: All participants completed the survey and 1 year follow-up evaluation after a year post-course demonstrated that the course improved their knowledge of surgical oncological oncology. The first day of the course, the mean satisfaction score was 3.37 and hands-on lab score was 3.55. In the second day, the mean satisfaction score of 3.22 and hands-on lab score was 3.45. Surgical anatomy lectures of radical prostatectomy, radical nephrectomy, radical cystectomy, pelvic lymph node dissection and demonstrational surgeries in cadaver sessions had higher scores than remaining subjects. Conclusion: Uro-oncologic surgical models using human cadavers are a feasible and effective method to learn the anatomical landmarks and surgical technique by in-training urologists.
Key Words: Cadaver; course; urooncology

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Introduction

Surgical training includes the acquisition of pre, intra and post-operative knowledge, skills, and practice with supervision of fully trained surgeons. Over the past decade, training programs with increased specialization for urological surgeons have emerged with longer and more advanced training programs[1]. Undoubtedly, urology trainees may seek a career in urologic oncology receiving well designed and organized fellowships, especially in United States[2]. However, there are no universal standards for uro-oncology training due to local programs educational, legal and training concerns.

It is still controversial what urologic oncologic procedures should be part of the standard urology residency and fellowship programs. The human cadaver remains the gold standard for medical students to understand anatomic landmarks and it should be incorporated into urologic oncology training programs[3]. There are no known studies to examine the effectiveness of different training modalities for open urologic surgeries. Conversely, several reports evaluated the optimal model for training in minimally invasive surgery including anatomic models, virtual reality laparoscopic video simulators, and animal training courses[4].

Herein, we described a training model of uro-oncologic surgery in human cadavers designed to train young surgeons to perform major uro-oncologic procedures. We analyzed the trainees' didactic evaluation and personal satisfaction with a survey at the end of each theoretical and hands-on module.

Materials and Methods
Course attendees' demographics and evaluation after each module was obtained. Data included age, gender, residency year, type of training program (university or training hospital), experience in uro-oncologic surgery and previous attendance to cadaver course.

Course Location and Scientific Program
With the collaborative effort of Turkish Urooncology Society (TUS) and Turkish Society of Anatomy and Clinical Anatomy (TSACA), and the Human Uro-oncologic Cadaveric Dissection Course (HUOCC) organization, the course was held at the Anatomy Department, Mersin University, during April 29 and May 1 of 2010. The course was offered to senior urology residents in Turkey and structured in two parts (Fig. 1). Senior anatomists and urologists were determined as mentors and faculty to provide the didactic lectures and proctor the hands-on course, while young urologists and academic anatomists worked as assistant trainers. A total of 18 hours of continuing medical education were giving including 3 hours of oral examination. The didactic sessions included faculty from the Anatomy and Urology department lectures in basic and surgical anatomy of Genito-Urinary system with emphasis on uro-oncologic surgeries. The lectures were given in the morning while the hands-on cadaveric training related to the morning lectures were applied in afternoon to complete the different modules. The course was organized for three days, including the oral examination at last day of the course.

Scientific Program
The Turkish Board of Urology Training Program guidelines were used to determine the procedures included in the scientific program. Surgeries included: radical prostatectomy, inguinal orchiectomy, retroperitoneal lymph node and pelvic lymph node dissection, partial nephrectomy, radical nephrectomy, adrenalectomy, radical cytectomy and extended lymph node dissection, and all procedures utilized specific surgical instrumentation for each specific surgery(see in Table 1). All surgical procedures were performed with step by step approach emphasizing the important anatomical landmarks that could result in intra and post-operative complications.

All cadaver models have been donated and released for medical education including anatomical dissection following the ethical and legal guidelines. The course organizers constantly reminded all participants and faculty of the guidelines to demonstrate the upmost respect towards the human cadaver models that graciously donated their bodies to Medicine. Only the areas of interest for each module were exposed on cadaver models, the rest of the body was covered with surgical drapes at all times.

Questionnaire
Following the training course, all participants completed a questionnaire, grading the quality/content of the lectures and the hands-on training. The evaluation forms were graded using a 4-point scale (1=poor, 2=moderate, 3=good and 4= very good) shown in Table 1. At 3 months and one year following the course, re-evaluation of the course was performed via telephone call.

Results
A total of 25 residents participated in a 3 day course that focused in Uro-Oncologic surgical anatomy and procedures. At the end of each module the participants graded the module. The lowest grade given was 1.9 for the module: Sectional and functional anatomy of stomach, bowels and colon. Conversely, the highest grade (3.9) was given to the module: How to perform radical retropubic prostatectomy with/without nerve sparing: Surgical anatomy with check list (Table 1)

Mean age of trainees was 25±3.6 years. Fourteen (%56) trainees were residents from the university program while 9(%44) from other training programs. All participants performed the open uro-oncological surgeries in their daily practice as 1st or 2nd assistants. Ten (%40) trainees reported knowledge of upper urinary tract laparoscopic surgeries performed in their institution (nephrectomy and ureterolithotomy). None of the attendees had previous urological open surgical training course with cadaveric models. This course was the first cadaveric course created and organized by TUS. A total of 4 human cadavers were used. In each table, one proctor urologist and anatomist and one assistant urologist were present. All surgeries were performed step by step mimicking open surgeries. The steps of radical prostatectomy on cadaver were shown in Figs. 1-3 as one of the uro-oncologic procedures. The anatomical landmarks of retroperitoneal lymph node dissection procedures demonstrated lean and less bulhy anatomy versus the real live cases due to chemical to preserve the cadaver (Figure 4).

No participant had any previous course of open urological surgical training with the cadaver model, and 19 proctors and assistants participated in the course. A total of 4 human cadavers were used and for each model, at least one proctor urologist, one proctor anatomist and one assistant urologist were present at all times.

The mean grades of each module were shown in Table 1. The didactic part of radical prostatectomy, inguinal orchiectomy, retroperitoneal lymph node dissection and pelvic lymph node dissection obtained a mean score of 3.37, and hands-on score of 3.55. The radical nephrectomy, partial nephrectomy, adrenalectomy, radical cystectomy and extended lymph node dissection obtained a mean score of 3.22, and hands-on score of 3.45. Surgical anatomy of radical prostatectomy, radical nephrectomy, radical cystectomy, pelvic lymph node dissection and surgeries in cadaver sessions had higher scores than others. Three months after this course, we called all participants to answer a quick survey whether their uro-oncologic knowledge and experience were enhanced due to the course and all participants answere affirmative.
But when asked again a year later after the course 84% (21) trainees were still positive about the learning benefits of the course while the rest of attendees were uncertain about the benefits of the course.

Discussion
Anatomic knowledge is essential in surgical training. Due to innovative technology the same anatomical landmarks for open surgery may be presented differently during laparoscopic surgery or after chemotherapeutic drugs, creating a more complex and challenging surgical environment for one to perform surgery[2]. Therefore, emphasis of surgical training program must include a robust well organized program dedicated to teach surgical anatomy and hands-on training during live surgeries.

Novel teaching techniques include the use of simulators, animal labs but all different courses have their pros and cons, either the cost is high or real-time simulation is suboptimal or the animal model has no similar human anatomical landmarks.

Certainly, not all residency programs may have a standardized urologic oncology training program during residency. A recent survey among Turkish urology residents demonstrated that 60% of residents will choose urologic oncology as a subspecialty in urology and will seek further training following residency[5].

Table 1. Scientific program and Survey Evaluation of each module.

1st day	Section points
The importance of anatomy in Urooncologic surgery	3,44
Intraabdominal and pelvic lymph system: Organ specific functional anatomy	3,18
Prostate, vesicular seminalis, vas defens and endopelvic anatomy: pelvic plexus and fasial classification	2,61
How to perform radical retropubic prostatectomy with/without nerve sparing?: Surgical anatomy with check list	3,94
Surgical anatomy of pelvic and extended lympadenectomy	3,89
Basics and functional anatomy of testis and epididimis	3,00
Anatomic classification of retroperitoneal lymphatic system	3,19
How to start and perform retroperitoneal lymp node dissection? Surgical Anatomy	3,76
1st day Surgical Training on Cadaver (Retropubic Radical Prostatectomy Pelvic lymph node Dissection, Radical Orchiectomy Retroperitoneal Lymph Node Dissection	3,55
2nd day	
Topographic, sectional and functional anatomy of Kidney	3,10
Surgical anatomy of Radical And partial nephrectomy: How to?	3,86
The Anatomy of Upper and Lower urinary tract: Important anatomic landmarks	2,90
Anatomy of Adrenals: Functional Assessment	3,20
Surgical technique of adrenalectomy: How to?	3,86
Sectional and functional anatomy of stomach, bowels and colon	1,90
Surgical technique of radical cystectomy and anatomic landmarks for ileal conduit	3,75
2nd day Surgical Training on Cadaver (Partial Nephrectomy, Radical Nephrectomy, Nephroureterectomy, Adrenalectomy, Radical cystectomy and extended lymphadenectomy)	3,45

Therefore, the HUOCC was sought after urology residents interested in urologic oncology. The human cadaver model has been traditionally used by anatomists to provide medical students the basic

Figure 1. Appearance of Endopelvic Fascia (Cadaver)
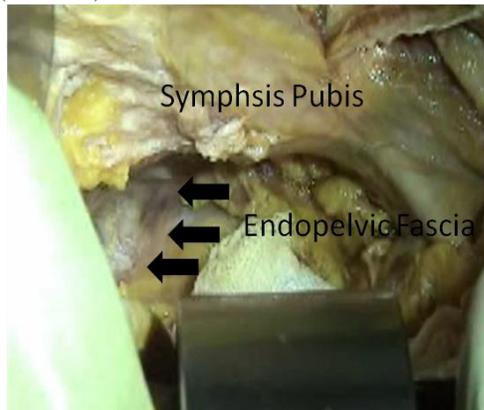
Figure 2. Dissection of Vas deferens after exposure of Denonvillier's fascia.
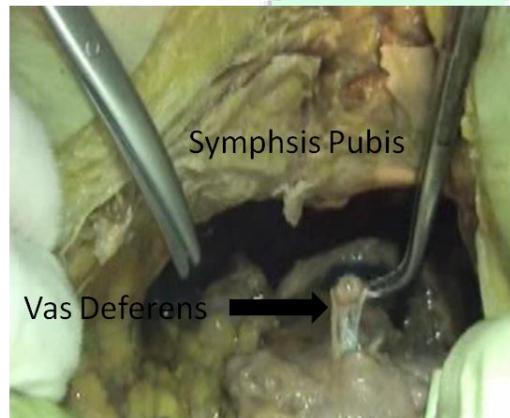
Figure 3. Prostate specimen of cadaver with excision of seminal vesicle.

Anatomy knowledge during their medical education. Equally, surgeons revisit the surgical anatomy during live cases with their trainees. Thus, we believe surgical courses using human cadaver models may optimize learning since it is the most similar environment that one will find when performing surgery [6,7,8,9,10,11].

Although, the use of animals as surgical models is an easier alternative, the use of animals have been banned in certain countries i.e.; England and Canada due to concern of possible contamination of health-care providers livestock-infecting diseases[3].

Figure 4. Anatomical landmarks of Retroperitoneal Lymph Node Dissection procedures (main Vascular structures demonstrated with umbilical tapes)

The course was designed to provide a step by step approach for each surgical procedure included in the program. The overall course evaluation revealed a high level of satisfaction by the attendees (3.55-1st day and 3.45-2nd day) matching results from Giger et al that reported that surgery training on human cadaver provided a high overall attendees satisfaction[12].

We found that the cost of the cadaver course was low due to the collaboration of the Anatomy department, medical-legal department and the TSACA. It is clear that there were concerns and careful attention of the course organizers and attendees to respect the local cultural values and medico- legal issues linked to the use of human cadavers to enhance academic training and education. Also, there are so many variables and constant challenges to find human cadavers for training due to the national shortage. However, this contemporary course designed for uro-oncological surgery trainees may not use high technological resources but the most and real machinery available to mimic real surgery still is the human anatomy.

There are a number of limitations in this study. There was no validation of the course evaluation and the number of study attendees was limited, but since this was the first course of this nature in Uro-Oncology we believe that future evaluations will better delineate the validity of these findings.

Other issues with this model included the dramatic alteration of the lymphatic tissue limiting the dissection since they would lack the consistency and flexibility during the processing of cadavers. Evidently, the lack of blood flow that could mimic the real surgical arena also created a limited real visualization of hemorrhage but overall the cadaver model achieved its objective of educating participants about the anatomic landmarks and step by step surgical procedures using appropriate instruments mimicking the real surgical arena.

Conclusion

In conclusion, this course showed that the open urologic oncology surgery training courses are sought after and is contemporary as the minimally invasive surgery courses and important for urology residents' training. Maybe each institution should have these courses for their residents when surgical oncological cases are scarce and without the risk of morbidities related to the surgery. The collaboration of faculty from the Anatomy and Urology specialties are pivotal for the success of the course.

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ABBREVATIONS : Turkish Urooncology Society :TUS, Turkish Society of Anatomy and Clinical Anatomy :TSACA, The Human Uro-oncologic Cadaveric Dissection Course :HUOCC

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