

# Impact of cadaveric surgical anatomy training on urology residents knowledge: a preliminary study

## Kadavra cerrahi anatomi eğitiminin üroloji asistanları bilgisi üzerine etkisi: ön çalışma

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### ABSTRACT

**Objective:** Cadaveric dissection is used as a major tool for anatomy education at the medical school. In this study we aimed to determine how a uro-anatomy cadaveric dissection course would impact urology residents knowledge.

**Material and methods:** A three days course was given to 50 urology residents by experienced trainers in 1-3 June 2012 at Ege University Medical School's Anatomy Department, İzmir, Turkey. Efficacy of the course was assessed using a multiple choice questionnaire of 20 questions given before and after the course.

**Results:** Completed questionnaires before and after the course were available for 25 residents (50%) that were included. Residents answered correctly to 11.7 out of 20 questions (59%) before the course and 13.0 out of 20 (65%) after ( $p<0.05$ ). In individuals analysis, 16 residents (64%) increased their scores, 4 (16%) had similar scores and 5 (20%) had lower scores. The number of correct answers for 6 out of the 20 questions was lower following the course.

**Conclusion:** This cadaveric surgical anatomy course was effective in improving surgical anatomy knowledge for most urology residents but not all and helped to identify ways to improve the course in the future.

**Keywords:** Anatomy; cadaver; education; training; urology.

### ÖZET

**Amaç:** Kadavra diseksiyonu tıp fakültesinde anatomi eğitiminin temel öğesidir. Bu çalışmamızda üro-anatomi diseksiyon kursunun üroloji asistan bilgisi üzerine etkisini tespit etmeyi amaçladık.

**Gereç ve yöntemler:** 1-3 Haziran 2012 tarihlerinde Ege Üniversitesi Tıp Fakültesi Anatomi Kliniğinde 50 üroloji asistanına deneyimli eğitmenler tarafından 3 günlük kurs verildi. Kursun etkinliği, kurs öncesi ve sonrası yapılan çoktan seçmeli 20 sorudan oluşan test ile değerlendirildi.

**Bulgular:** Soruların tamamını kurs öncesi ve sonrası yanıtlayan 25 asistan (%50) çalışmaya dahil edildi. Asistanlar kurs öncesi 20 sorudan ortalama 11,7 (%59) oranında soruya doğru cevap verirken bu oran kurs sonrası 13,0 (%65) olarak tespit edildi ve bu fark istatistiksel olarak anlamlıydı ( $p<0,05$ ). Kişisel analizde 16 asistan (%64) kendi ortalamasını yükseltirken, 4 (%16) asistanın aynı seviyede doğru cevap verdiği ve 5 (%20) asistanın doğru cevap oranının düştüğü izlenmiştir. 20 sorunun sadece altısında kurs takibinde doğru cevap oranında düşüş izlendi.

**Sonuç:** Bu kadavra cerrahi anatomi kursu bütün asistanlarda olmasa da bir çoğunda cerrahi anatomi bilgisini artırmıştır. Bu öğretim yöntemi ileride daha başarılı kursları tanımlamayı kolaylaştıracaktır.

**Anahtar kelimeler:** Anatomi; kadavra; eğitim; öğretim; üroloji.

### Introduction

Knowledge in anatomy is essential for a safe and effective medical practice.<sup>[1]</sup> Training sources available for anatomy education are expanding such as anatomy software, live surgery anatomy or medical imaging, but access to cadaveric anatomy is becoming less common.<sup>[2]</sup> Cadaveric dissection is used as a major tool in learning anatomy, owing to its perceived

effectiveness for understanding classification and inter-relationship of different body parts, integration of theory and practice of anatomy, touch-mediated perception, three-dimensional perspectives of structures, and application of practical skills.<sup>[3-10]</sup> In addition, surgeons may be exposed to pathological conditions and/or anatomical variations during the dissection process, which enhances their learning experience. Through the use of prosection, cadaveric

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material can be expertly dissected to show surgeons exactly what is intended for them to see without the risk of it being damaged by inexperienced hands. Moreover team-based learning methods in teaching topographical anatomy by dissection provides better acquisition of such knowledge than the previous methods of anatomy teaching to which students have been exposed. Learning anatomy via a surgical approach provides a relevant, in-depth, purposeful and enjoyable learning experience. This technique also provided a valuable insight into surgery.<sup>[1]</sup> On the other hand dissection videos did not improve performance on final examination scores; however, students favored their use.<sup>[13]</sup>

The value of anatomy dissection courses using human cadavers in imparting anatomical knowledge has been clearly established.<sup>[14-16]</sup> Nonetheless, most studies have shown that this applies to medical student learning anatomy. Residents in surgical specialties are regularly exposed to anatomy through surgery or medical imaging and it is unknown whether they will benefit from anatomy courses based on cadaveric dissection. In this study we aimed to determine how a course using cadaveric dissection would impact on urology residents' knowledge in kidney, prostate, pelvic and genital organs anatomy.

## Material and methods

The study was conducted after the approval of the local ethics committee, among 50 urology residents who undertook a three days surgical and theoretical urological anatomy cadaveric dissection course in 1-3 June 2012 at Ege University Medical School's Anatomy Department, İzmir, Turkey. Mean age was 29 years (26 to 35). All residents were males. The course was advertised by emailing urologists members of the International Young Urologist Association (IYUA) and through its website ([www.iyua.org](http://www.iyua.org)). The number of places was limited to 50. The subsequent topics of the course on urological anatomy were: (A) kidney, ureter and retroperitoneal region (5 hours); (B) prostate (4 hours); (C) Bladder, urethra and pelvis (4 hours) and (D) penis and scrotum (4 hours). Each topic had a consistent sequence of educational activities including urological interactive lecture (1-1,5 hours), task-driven directed self-study in preparation for a subsequent small group work (1 hours), and practical anatomy course (2-2,5 hours).

A formal 25 minutes examination took place before and after the course. The examination consisted in 20 multiple-choice questions with a maximum of five alternative answers. Section A, B, C and D had 11, 5, 3 and 1 questions respectively. The questions were randomly selected from a bank of multiple-choice questions prepared by the 37 scientists. The same 20 questions were asked to the residents before and after the course.

## Statistical Analysis

The main outcome measure was overall examination score. Data was analyzed using the Statistical Package for Social Sciences

version 15 (SPSS Inc, Chicago, IL, USA). Significance testing of proportions was appropriate by using Wilcoxon matched pairs test, where  $p \leq 0.05$  was considered significant.

## Results

Completed questionnaires before and after the course were available for 25 residents (50%), 19 refused to participate and 6 were excluded because they did not answer all the questions (Figure 1).

Residents answered correctly to 11.7 out of 20 questions (59%) before the course and 13.0 out of 20 (65%) after ( $p < 0.05$ ). The detail for each individual is reported in Figure 2. For 13 questions (65%), the number of correct answers was higher following the course (Figure 3). All residents had a pre course score  $< 15$ , and three had a post course score  $\geq 15$ . Scores in sub groups questions (A, B, C, D) also increased after the course ( $p < 0.05$ ) (Table 1). In individuals analysis, 16 residents (64%) increased their scores, 4 (16%) had similar score and 5 (20%) had a lower score (Figure 3). No question was answered correctly by all residents in the pre-test, while 3 questions were answered correctly by all residents after the course. These questions were about muscles anatomy. Worse results were observed following the course for 6 questions (30%) mainly about arteries anatomy.

We also observed lower score for foreigners (average score on 20 before and after) but this did not appear as statistically significant.

## Discussion

Overall, this course on cadaveric surgical anatomy improved residents' knowledge in uro-anatomy. Nonetheless, the training was not efficient for 36% of the residents who achieved worse or similar post course scores. This highlights the limits of this course and gives suggestions on topics that need to be better

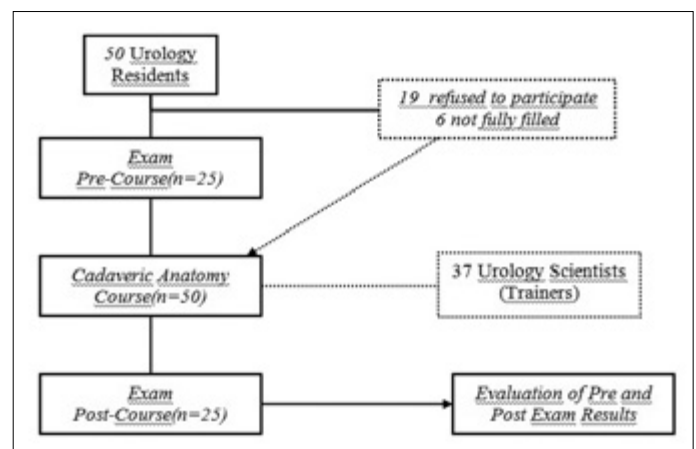


Figure 1. Flow chart of the study

detailed in future to improve its educational value. It is also possible that questions with similar or worse post course scores were confusing and need to be rephrased. A validation process of the questions was lacking and will be integrated in future courses. Nonetheless, the examination assessed objectively the impact of the course on residents' knowledge. Theoretical knowledge was only one part of this training which includes practical aspects of urological anatomy that were not assessed by the questionnaire and are of critical importance for surgical practice. The natural view of anatomical structures is particularly beneficial to the trainees learning process as it relates to texture, color, location, size, and function of the various organs.<sup>[17]</sup>

Anatomy dissection courses using human cadavers have long been used to impart anatomical knowledge to surgical trainees.<sup>[14-16]</sup> This process provides a valuable insight into surgery and focus on the anatomy.<sup>[1]</sup> The design of classic lectures, notes and practical anatomy laboratory lectures empower the residents to direct, evaluate and reflect on their learning. This teaching method based on student-directed fresh tissue anatomy courses is appreciated by students who found objectives were clear, achievable, and taught effectively with relevant clinical correlates.<sup>[18]</sup>

Another advantage of the laboratory session design is the interaction between educational doctors and trainees which offers an opportunity for professional development and continuous improvement of resident teaching skills. Trainers have been established as an effective teaching resource in several areas of gross anatomy education.<sup>[19-21]</sup> This study gave also the opportunity for 'stepped procedure' learning in surgical education. First residents see the anatomical structure in real body but bloodless and safely. Then they can use the knowledge during surgical procedure of living bodies. During the learning period, using the surgical steps to determine the lack of training could be suggested.<sup>[22]</sup> Nonetheless, whether this course will impact on surgical training remains to be proven.

The challenge is to find cost-effective models and teaching systems that have a high reproducibility with humans and have a high degree of transferability from the training model to the living human. Traditional model of clinical training is the most common source of training for residents but has various disadvantages. Inefficient and dangerous practices may be perpetuated and inadequate supervision of procedural skills in the

operating theatre was reported by advanced surgical trainees.<sup>[23-25]</sup> Benefits of a competency-based training should include rapid improvements in trainees' skills that are sustained and transferable to the clinical setting.<sup>[23]</sup> Live animal models are interesting to learn the principles of surgery but they are not broadly available, of little interest for learning human anatomy, expensive and carry a potential infectious risk. Simulators or dissection videos have also been used but the latest were not

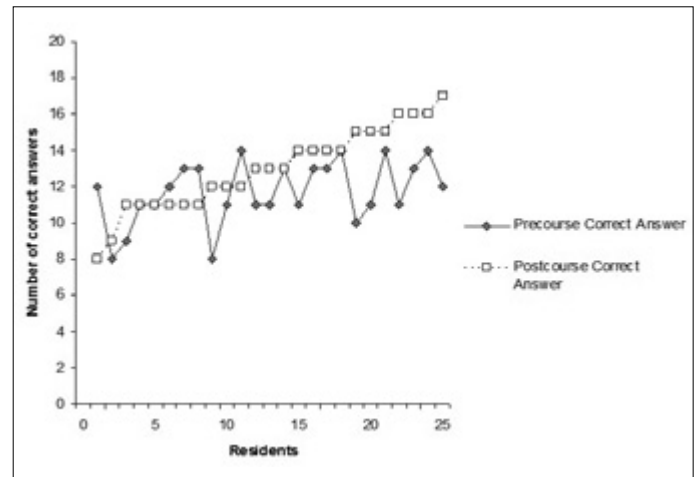


Figure 2. Number of correct answers before and after the course for each resident

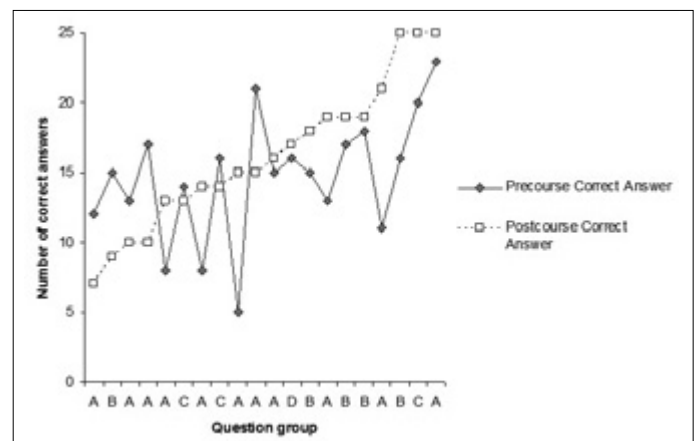


Figure 3. Number of correct answers before and after the courses for each question

Table 1. Average number of questions in each subgroup properly answered by the residents

Question Group	Section A	Section B	Section C	Section D	All
Number of questions	11	5	3	1	20
Precourse average number well answered (% of all questions)	5.8 (52.7%)	3.2 (64%)	2 (66.7%)	0.6 (60%)	11.7 (58.5%)
Postcourse average number well answered (% of all questions)	6.6 (60%)	3.6 (72%)	2.1 (70%)	0.7 (70%)	13 (65%)
Difference	13.8%	12.5%	5%	16.7%	11.1%

improving performance on final examination scores; although students favored their use.<sup>[13]</sup>

One of the limits of the assessment of the educational value of this training method was the number of residents who refused to complete the questionnaire. This is possibly related to poor anatomy knowledge in this subgroup and it remains unknown whether a minimal background in urological anatomy would be required for optimal course efficacy. Questionnaire assessment of any educational program is of paramount importance for the trainers should they wish to improve the quality of the course in further teaching sessions. Ideally, a salvage session for those having knowledge in some sub topics would warrant the objectives of the course were reached. This study did not assess whether knowledge acquisition also remained or faded quickly with time. In the future, technical training components could be implemented following this course so to favor surgical training efficacy and safety.

Altogether, based on strict objective data this course improved responses rates and probably knowledge in anatomy. Nonetheless this is only part of the benefits expected from such a course. The ability for residents to better recognize anatomical structures in the human body during practical session aims to improve their surgical skills. This was not measured although this is likely to be the main objective for residents. Measuring this would be uneasy, but we plan to add questions for future courses on whether the course might be of any clinical use for their current or future practice and whether future courses should be tailored in a different way to respond such needs.

This study showed that a cadaveric surgical anatomy course is effective in improving surgical anatomy knowledge in most urology residents and helped to identify ways to improve the course in the future. Whether cadaveric surgical anatomy training performs better than other methods would require further studies.

**Ethics Committee Approval:** Ethics committee approval was obtained.

**Informed Consent:** We didn't use patients, patients' names, initials, or hospital numbers, especially in any illustrative materials in this questionnaire study. Informed consent forms were not necessary for these reasons.

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**Hasta Onamı:** Mevcut anket çalışmamızda hastalar, hasta isimleri, isimlerin baş harfleri ya da hastane dosya numaraları hiç bir belgede kullanılmamıştır. Bu nedenlerle, hasta onam formları çalışma için gerekli değildir.

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