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INTEREST OF A SHORT AND STRUCTURED TRAINING TO LAPAROSCOPY: AN OPINION SURVEY UPON RESIDENTS

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ABSTRACT

Simulation represents, nowadays, an important pedagogic tool facilitating the learning of laparoscopic surgical skills especially to young residents. It is a safe way that allows them to overcome their deficiencies and it impacts directly their capacities in the operating room facing real patients. Our study was conducted on 28 residents in the General Surgery Department and the Gynecology/ Obstetrics Department. We evaluated their satisfaction after their participation in, at least, one training session carried out in the simulation unit of the faculty of Medicine of Monastir in Tunisia and the interest of this structured training in their subsequent practice of laparoscopy. For this, we distributed an anonymous questionnaire to the residents assessing their age, specialty, the number of training sessions in which they have participated, the type and the disponibility of instruments, their level of satisfaction and finally their suggestions in order to improve the quality of the training. Results have shown that 43% of the residents were generally satisfied at the end of the training session. The training on animals was the most appreciated for 11 participants and all the sessions were payable. According to 14 of them, this type of learning have enhanced their self-confidence and helped them control stressing conditions in their daily practice. Furthermore, 18 residents have noticed a significant improvement of their dexterity while operating in real conditions. The different studies conducted on the same subject have related an increasing interest of the simulation in the training of young surgeons and the enhancement of their surgical performances. Therefore, we need a tested verified training in order to answer the residents' needs and include it in their global curriculum as a safe efficient teaching tool.

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INTRODUCTION

Simulation is used, in many fields such as aviation, as an efficient and secured tool to teach young students. In Medicine, it occupies an important place especially in laparoscopic surgery where it is considered nowadays as a master piece of young surgeons learning. The important development of laparoscopic surgery imposed on surgeons the acquisition of multiple skills such as the capacity of visualization of the surgical field in two dimensions (Frigenzaa, 2014 and David Lasko, 2009). Simultaneously, simulation, through the design of laparoscopic simulators and the development of curricula and learning workshops, has clearly developed in this field. A laparoscopic training program including basic laparoscopic procedures is essential before performing laparoscopy in patients. This program must involve several steps from the simplest gestures of the manipulation of the instruments to the most complicated gestures of suture. Specific models to the different surgical procedures performed using laparoscopy are included in this program. This training in laparoscopy would provide the basic gesture for beginners (exposure, gripping and manipulation of the forceps), improvement and technical gestures for pros (ligatures, sutures and anastomoses). The objective of this study was to evaluate the satisfaction of residents participating in a short-term simulation training at laparoscopy that combines theoretical and practical teaching and to evaluate the interest of these different tools in their initial training.

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MATERIAL AND METHODS

Methodology: This is a descriptive study of residents in general surgery and gynecology who attended at least one

laparoscopic simulation session at the Simulation Center of the Faculty of Medicine of Monastir.

Elaboration of the questionnaire: In order to evaluate the benefit of learning laparoscopy by simulation, we have developed an anonymous questionnaire that examines the demographic characteristics of residents (age, sex and specialty), their level of training, the number of assisted simulation sessions. The setting of the session, the means of simulation studied, the availability of instruments, the duration of the session, the resident's judgment, satisfaction and suggestions. Data collection was done from the questionnaire distributed by e-mails found among the contact information of residents participating in simulation learning sessions organized by the Simulation Center of the Faculty of Medicine of Monastir. The data was then processed by the Microsoft Excel software. The results are presented in the form of tables and graphs.

Simulation Techniques Available and Studied by Residents: Several models were studied by the residents during the simulation.

- The pelvi-trainer
- The animal model

The 2 animal models reported in simulation are pork and rabbit. They allow to carry out a cholecystectomy, sutures or digestive anastomoses, an hysterectomy or an annexectomy.

The Lapsim : Residents had the opportunity to have this type of virtual laparoscopic trainer in the Simulation Center of the Monastir School of Medicine.

RESULTS

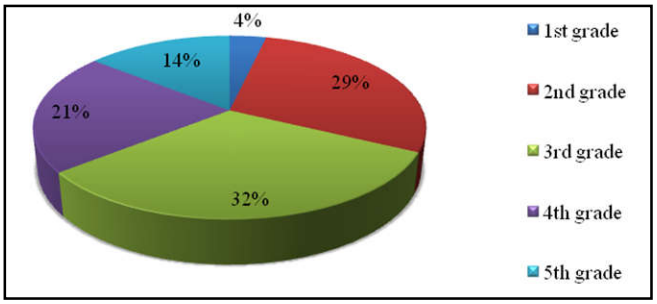
Thirty-five questionnaires were sent to residents of visceral surgery and residents of gynecology. Twenty-eight questionnaires were retrieved with an 80% response rate.

Demographic Characteristics of Residents

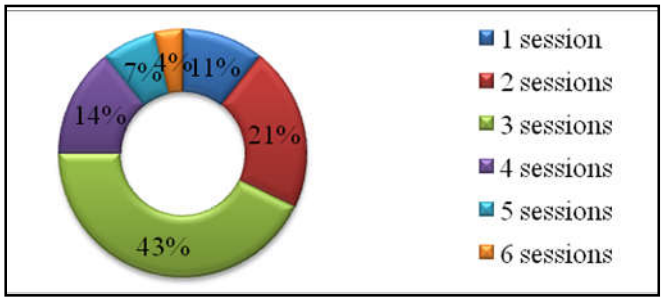
Gender : Residents who responded to the questionnaire were sixteen women and twelve men with a sex ratio equal to 0.75.

Distribution of residents by specialty: There were seventeen (61%) general surgical residents and eleven (39%) residents of gynecology.

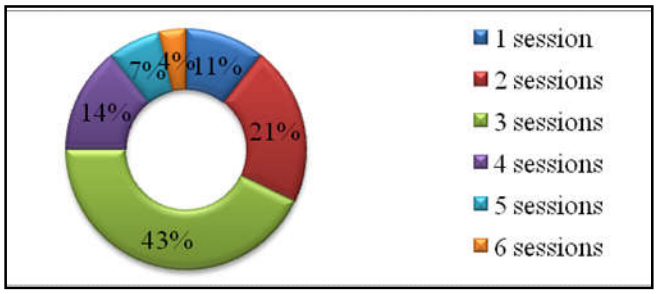
Resident Training Year: Residents in 3rd Grade accounted for 32% of all residents who responded to the questionnaire.



Features related to the simulation training session: The majority of residents (43%) have attended 3 laparoscopic simulation sessions.



The majority of residents attended the simulation sessions at a conference or workshop.



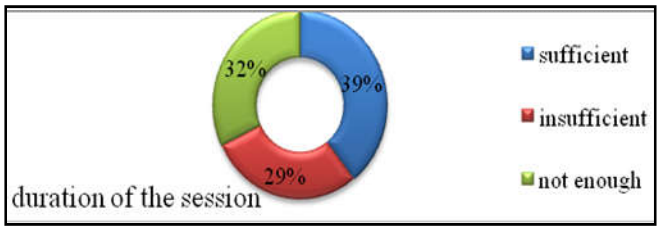
All residents stated that the training they received was paying. All residents had a training on Pelvi-trainer, 23 of them worked on Lapsim and only 13 residents practiced laparoscopy on the animal model.

The conditions of the session:

Availability of instruments: 24 residents claimed that the instruments needed were available.

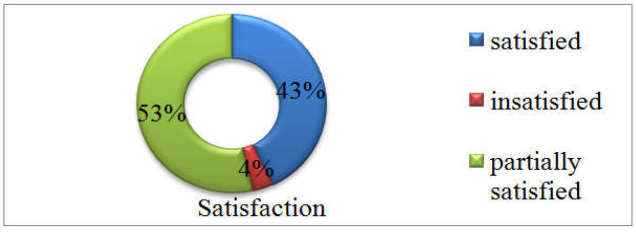
Suitable instruments: 16 residents noted that the instruments were suitable.

Duration of the session



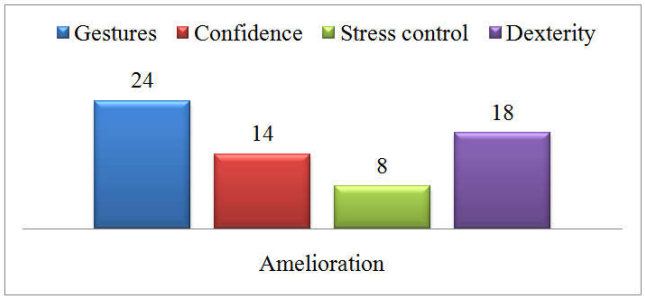
All residents stated that during the training sessions they received, they were assisted by an instructor and worked in a group.

Residents satisfaction with laparoscopy teaching by simulation: 43% of residents were satisfied by the end of the session.



71% of residents state that the simulation session was formative. Twenty-four residents stated that during their

subsequent practice in laparoscopic surgery they have felt an improvement.



Prospects: The animal model was the most preferred model by residents.

	yes	no
Evaluation at the end of the session	23	5
The presence of a certificate	27	1
Make the simulation compulsory during the university course	27	1

Suggestions: The suggestions that have been proposed were to make the animal model available in all faculties with always a free simulation training. The evaluation is obligatory at the end of each level thus allowing the passage to the following stage. Learners also claimed to organize groups according to the level of each resident in laparoscopy, making them more homogeneous with a better plan and multiply sessions to be more effective. They asked to reduce the number of participants per training session and to establish a laparoscopic surgery simulation school providing better training for residents. This training should become mandatory in the resident curriculum.

DISCUSSION

The simulation has 3 main goals: detect, avoid and manage errors.

The learning circle, according to Pr Assouline, [3] allows:

- To master the technical gestures to be able to reproduce them with confidence during real situations
- Integrate decision-making and assess its merits
- To be active in an emergency situation, without ever being dangerous, either for oneself or for the patient
- To practice working in a team
- To manage all situations, including the most serious or the rarest.

Special features of laparoscopic surgery simulation: Nowadays, most common procedures performed in digestive surgery or gynecology are often performed laparoscopically. This surgical approach however requires a mastery of several skills totally different from those required in conventional surgery. By using the laparoscopic approach, the surgeon is confronted with several constraints:

Loss of the depth of the operative fields created by the binocular vision since the surgeon looks at a screen, inversion of the movement of the instruments since they rotate around a fixed axis and finally the obligation to orient yourself quickly in a blind space since only a small part of the operative field can be visualized.

In order to master this approach, specific learning must be established because the experience and expertise in open surgery is not totally transferable in laparoscopic surgery (Figert, 2001). The variation in skills between individuals is more marked compared to the open approach and it is admitted that at least 10% of individuals are naturally resistant to learning these skills (Aggarwal, 2006 and Wanzel, 2007).

Skills and gestures required in laparoscopic surgery: The surgical procedure involves several steps going from basic simple gestures (nodes, sutures, manipulation of the instruments..) to the most complex (dissection of the structures without damaging the neighboring organs, resection of an organ ..) At an ultimate stage, it is rather to emit an operating strategy and to solve the difficulties encountered (presence of adhesions, anatomical variants, etc.). Each time it is a special situation and not very reproducible for which the acquisition of a competence is essential in order to face these difficulties. Finally, the surgeon must acquire a certain aptitude to adapt to the potential per-operative incidents (visceral wound, haemorrhage ...) and to manage the stress and the environment (surgical team, technical platform ...). Thus, the training of the surgeon must cover non-technical skills such as situational awareness, communication, decision-making, teamwork and leadership. This maximizes safety and quality within the operating theater (Youngson, 2011 and Flin, 2007).

Specific models for teaching laparoscopy by simulation

Simple simulators: Laparoscopy can be taught through non-expensive simple simulators that are ideal tools for learning basic laparoscopic procedures. These are simple simulators (pelvi-trainers) allowing the future surgeon to become familiar with the 2D vision as well as the reduced operating field similar to that offered by the cameras of the various laparoscopic devices (Beyer, 2010). These tools also make it possible to manipulate new instruments that are often quite developed compared to those used in open surgery that have several original effects (thermo-coagulation, clip holders, aggravators, etc.). Each of these instruments requires learning to ensure proper use and to achieve the desired result.

Animal model: For the complex gestures (cholecystectomy, hysterectomy, suture of a digestive wound), one needs a more complex model whose anatomy more or less recalls the anatomy of the man. These situations, which are close to reality, make it possible to reproduce the situations encountered in laparoscopy. The anatomy of the animal may not be identical to the human anatomy but the use of the animal model allows tohave a tactile perception and an analogy of the structures which makes it an excellent model to learn complex gestures or the association of several gestures. For example, the rabbit is used to simulate thoracoscopy or laparoscopic surgery in a small space recalling the conditions of pediatric surgery. Pork is the standard model used to learn laparoscopic surgery given the similarity of anatomy of this animal with the Man as well as the reaction of the tissues in front of the suture or the dissection.

Advanced simulators (Lapsims): These sophisticated simulators are another way to learn simple basic laparoscopic gestures. This type of simulator has already been used in other fields such as aeronautics and transport. It allows to learn basic simple gestures but also the most complex ones mimicking the complete course of an intervention.

Advances in technology and computer science have resulted in a perfect realism in the manipulation of anatomical structures. We can thus find the return of force by manipulating the various structures allowing to perceive their elasticity and their resistance. This model is easy to use which makes it interesting and beneficial for learning even though its cost is still too high. Before concluding, in recent years, robotic surgery has represented a significant technological innovation in the world of surgery. However, just like laparoscopy, a structured teaching of this technique should be instituted before this technique becomes part of the surgeon's daily routine. A prospective study has just demonstrated the benefit of simulation in learning this new surgical approach (Hung, 2012).

Residents satisfaction: A study by (Jordan, 2015), that evaluates a pedagogical program including theoretical courses as well as practical sessions on different simulators targeting residents in gynecology-obstetrics concluded a satisfaction rate of 100% evaluated using a scale of visual assessment (EVA) rated 8.7 / 10. 95% of residents wanted to make simulation mandatory in their training curriculum. Similar work carried out in different specialties confirmed this idea (Wiel, 2009 and Fiard, 2014). An improvement in professional practices was due to the simulation according to Fransen et al. (Fransen, 2012).

Interest of simulation as a teaching tool in laparoscopy: The training of a resident in surgery is essentially based on learning in the operating room. However, simulation is an effective teaching tool that is especially safe for both the resident and the patient. Thus, it allows the acquisition of different techniques and skills necessary for the transition to reality. In this way, Jordan et al found a significant improvement in the scores obtained at the evaluations between the 1st and 2nd simulation sessions (Jordan, 2015). Faure et al (Faure, 2015) noted in his study that as time went by, the operating time decreased with a safer surgical procedure. The simulation allowed our residents to cope with several situations and to master several surgical procedures such as sutures on pelvi-trainers or cholecystectomies and hysterectomies on Lapsim. These types of simulators provide a better learning curve, as shown by a Flemming Bjerrum study of virtual simulator appendectomy (Flemming, 2016). Simulation has also been shown to increase self-confidence and stress management. This was demonstrated by Bréaud (Bréaud, 2012), who used in his study emergency situations by the use of models with a clear improvement on the professional practice.

Finally, the simulation usually takes place in a group which reinforces and encourages collective work. In our study, all residents claimed that they worked in groups. This advantage has been demonstrated by Bréaud, (Bréaud, 2012) and Benzaken S (Benzaken, 2011). All these advantages of simulation confirm the contribution of this tool in the practical training of residents in surgery and gynecology as well as all other surgical specialties. However, it remains a means that requires enormous resources, both human and financial. Note that these sessions are provided in the Simulation Center of the Faculty of Medicine of Monastir. Acoording to our results and the comments of the learners we propose to make the animal model available in all faculties, to make the simulation training sessions free. A relationship of trust between the trainer and the learners is important to be established.

Conclusion

Simulation is a reliable pedagogical tool for teaching surgical techniques to young residents and thus safely improving their deficiencies, which offers a measurable improvement to their subsequent professional practice. It allows the acquisition of skills not only technical but also behavioral. This considerable contribution must be exploited by integrating this method of teaching into the resident's curriculum. The simulation training programs reconcile behavioral and technical imperatives in conditions close to reality, the complexity of which is progressive with the evolution of the future surgeon. Our study shows that simulation-based laparoscopic learning allows residents in general surgery and gynecology to experience less stress and discomfort and almost complete satisfaction with this method of learning. Further studies are needed to assess whether this improved feeling translates into better mastery of surgical techniques in complex situations that they may have to deal with in emergency situations. However, it is interesting to stress the importance of motivating and mobilizing the maximum number of qualified teachers and agents in this field in order to ensure continuous training with, above all, high quality.

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