

Evaluation of the quality of abdominal wall closure in murine models carried in undergraduate medical students.

Evaluación de la calidad del cierre de pared abdominal en modelos murinos realizada por alumnos de grado en Medicina.

Fátima M. González Lee Chong⁽¹⁾ ORCID: 0000-0001-8149-1355; Carlos Agustín Rodríguez Paz^(1,2) ORCID: 0000-0003-1802-0715; Alexia M. Moreno Ruiz⁽¹⁾; Luis G. Sánchez de Alba⁽¹⁾; Kevin Ramírez Ramos⁽¹⁾

1, Departamento de Cirugía; Escuela de Medicina; Universidad Cuauhtémoc; San Luis Potosí. 2, Hospital General de Zona 50; IMSS ; San Luis Potosí.

*Autor de correspondencia: fatima.gonzalez.lee@hotmail.com

Recibido: 22/8/2022; Aceptado: 10/10/2022; Publicado: 25/10/2022

Abstract: Introduction: Surgical teaching must be improved, always for the benefit of the patient, so that there are no adverse effects. Objective: To evaluate the quality of abdominal wall closure in murine models performed by medical degree students. Methods: Analytical, prospective and cross-sectional observational study. A universe of 55 students was considered as a whole, of which only 35 selected were included, who were evaluated on Wistar rat-type murine models, taking abdominal wall closure and scores according to the Anaya and Serrano questionnaire as variables. Results: 35 abdominal wall closures were evaluated, 23 of them with quality (65.7%) and 12, which were not of quality (34.3%). A proportion of quality closings is observed in approved students (f=18, 78.3%) versus not approved (f= 5, 21.7%) and also non-quality closings in approved students (f=8, 66.7%) versus not approved (f=4, 33.3%). Conclusion: Unsuccessful abdominal wall closures in murine models are not related to failing grades.

Keywords: skin, wound, murine models, surgery, skills.

Resumen: Introducción: Se debe mejorar la docencia quirúrgica, siempre en beneficio del paciente, para que no curse con efectos adversos. Objetivo: Evaluar la calidad del cierre de pared abdominal en modelos murinos realizada por alumnos del grado en medicina. Métodos: Estudio observacional analítico, prospectivo y transversal. Se consideró conjunto universo a 55 alumnos de los cuales solo se incluyen a 35 seleccionados, a los que se les evaluó sobre modelos murinos tipo ratas Wistar, tomando como variables el cierre de pared abdominal y las calificaciones según el cuestionario Anaya y Serrano. Resultados: Se evaluaron 35 cierres de pared abdominal, 23 de ellos con calidad (65.7 %) y 12, que no fueron de calidad (34.3 %). Se observa una proporción de cierres de calidad en alumnos aprobados (f=18, 78.3%) frente a no aprobados (f= 5, 21.7%) y también en los cierres de no calidad en alumnos aprobados (f=8, 66.7%) frente a no aprobados (f=4, 33.3%). Conclusión: Los cierres de pared abdominal no exitosos en modelos murinos no se relacionan con las calificaciones reprobatorias.

Palabras clave: pared abdominal, herida, modelos murinos, cirugía, habilidades.

1. Introducción

The abilities and skills that a general practitioner must have include basic surgical techniques and clinical skills, which are complex to develop experientially in clinical practice (1), given how delicate it is to manage hospitalized patients, considering the safety of the patient at on par with the teaching needs. A didactic solution to this problem can be provided through a system of animated biological simulators guided by teachers and tutors (2). This formal professional development is essential to achieve learning objectives in the health sciences that have a significant impact on the quality of patient care (3) and on the development of student skills (4).

Pedroso analyzed the medial tensile strength of the abdominal wall muscles, before and after making incisions in seventeen live pigs, concluding that the incisions reduced the tensile strength in the ventral abdominal wall (5). Dávila-Serapio practiced basic laparoscopic surgery procedures in animal models with 40 undergraduate students, concluding that five sessions are required to perform basic procedures satisfactorily (6). Serrano-Martínez publishes an evaluation of the development of surgical skills and abilities in cataract surgery using the EyeS® simulator, where he also describes a system by categories: instrument handling, forceps, capsulorhexis and the “divide and conquer” technique (7). Anaya-Prado shared a pilot study in sixty-two surgeons, giving them a written exam and another oral exam, including seven skill stations with a global rating, concluding a relationship between theoretical and practical knowledge (8). Gámez-Huerta adapts the Anaya and Serrano questionnaire to evaluate the extraction of lipomas in the hands of pigs by 11 students, using a marshmallow covered with gauze and caramel in a pig's hand, concluding that the evaluation is feasible for the student (9).

Abdominal wall closure is part of the procedures where it is necessary to have both clinical and practical knowledge, in order to be able to face medical situations related to surgery (10) ; It is quite true that the intention of the doctor's undergraduate training is not to create a pre-resident, but the clinical criterion that allows differentiating the risks of a poorly managed wound must be formed (1). For this reason, we think that our project will benefit their training in the medium term, to avoid or identify these risks, first as an undergraduate medical intern and then as an intern in social service; With this preparation, you will be able, if you wish, to have a series of more solid constructivist elements that will allow you to aspire to a surgical postgraduate specialty (11-12, 14).

Surgical groups of excellence that constantly contribute new techniques and knowledge always combine clinical practice with teaching and work in an experimental surgery laboratory (14-15). Our objective was to describe, through the modification of the Anaya-Serrano questionnaire, the skills of undergraduate students in wall closure in the murine model.

2. Methods

Analytical, cross-sectional observational study. Population: students of the XIV and XV Course of Basic Experimental Surgery of the School of Medicine of the Cuauhtémoc San Luis Potosí University. Non-probabilistic sampling by quota, based on the inclusion criteria, since, by having strict specifications to select each of the students and models, it ceases to be probabilistic, removing the opportunity for selection from other murine models, so that fees are at the logical discretion of the researcher. The 55 enrolled students were considered as a whole universe, of which 18 undergraduate students who did not perform an abdominal wall closure are excluded, 2 undergraduate students who dropped out during the courses are eliminated, and 35 are included. undergraduate students who

attended, accepted informed consent and performed abdominal wall closure. These were evaluated for the quality of abdominal wall closure on Wistar rat-type murine models.

The dynamics was made based on three laparotomy practices, the first is a liver biopsy, the second a splenectomy and the third a nephrectomy. It was carried out by undergraduate students, after being trained in said wall closure skill, first in the surgery drawer model to explain the tension and knot making (16) and the skills were perfected by monitoring a student instructor for every two students and under the supervision of a supervising general surgeon who is in charge of the extracurricular course. The modification of the Anaya (8) and Serrano (7) questionnaire, carried out by Dr. Gámez-Huerta (9), was used, considering three evaluation stations (Theoretical knowledge, knowledge of the material and development of skills). These questionnaires are graded from 0 to 10, considering greater than 7, passing grade and less than 7, failing. Within the course of surgery with murine models with rats, the third laparotomy practice was used, in order to have a learning curve of three procedures, which is the minimum that the student has to be able to consider that his training has a certain level of acceptance; The wall closure was considered quality as there was no visual dehiscence with perfect closure in the suture line, and non-quality as it presented this lack of continuity at any point of the laparotomy suture line.

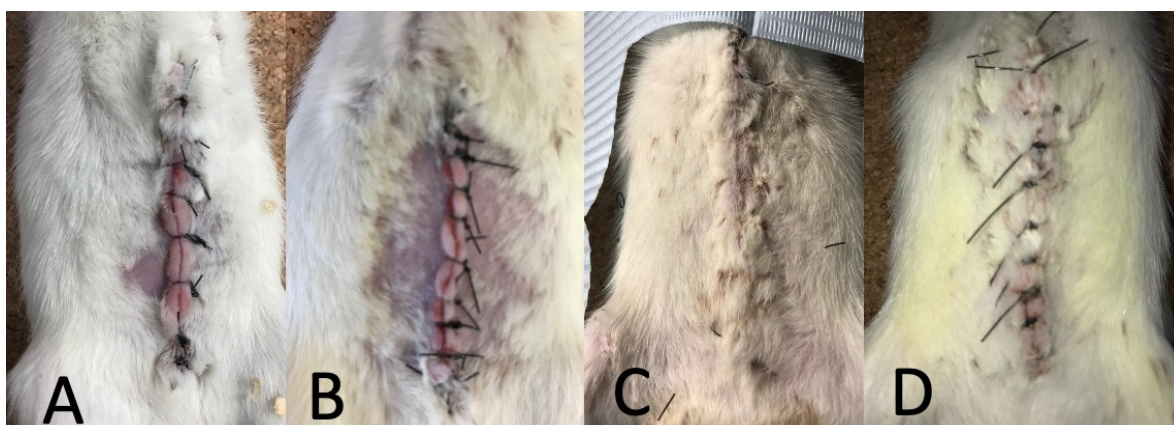


Figure 1. Examples of abdominal wall closures in murine models. In A and B, examples of sutures without quality are observed due to the elevation of the edges. In C and D, examples of quality closures are shown.

Percentage descriptions were used for the general data and evaluations and a statistically significant difference was established by means of Xi square for parametric or non-parametric tests, regarding the quality of wall closure by students in the established groups of closure with defect or without. The project is part of the educational research project for the development of surgical skills supported by the CEI-HGS-015-17 registry of the Research Committee, observing the suggestions for groups of medical students as a group of subjects to a research process (17) (18) (19).

3. Results

35 abdominal wall closures with average lengths of 5.4 cm long and 0.53 cm wide were evaluated, 23 were qualified as quality (65.7%) and 12 (34.3%) as non-quality. Within these last 12 non-quality closures, 7 (58.3%) had wound dehiscence, 3 (25%) had poor coping with elevation of the edge, and 2 (16.7%) had hematomas. The total average in the evaluation of surgical skills was 7.7. Of a total of 35 students, 9 (25.7%) passed and 26

(74.3%) failed. For its analysis, a cross table was used between quality and non-quality closures with the passing and failing grades. We can observe the proportion of quality closings in approved (f=18, 78.3%) and failed (f= 5, 21.7%) undergraduate students. A proportion of non-quality closures in undergraduate students approved (f=8, 66.7%) and failed (f=4, 33.3%).

Table 1. Chi-Square test. a) 1 cells (25.0%) have expected a count less than 5. The minimum expected count is 3.09. b) Only 0.734 has been calculated for a table.

Pruebas de chi-cuadrado						
	Valor	df	Significación asintótica (bilateral)	Significación exacta (bilateral)	Significación exacta (unilateral)	Probabilidad en el punto
Chi-cuadrado de Pearson	.555 ^a	1	.456	.685	.361	
Corrección de continuidad ^b	.114	1	.736			
Razón de verosimilitud	.542	1	.462	.685	.361	
Prueba exacta de Fisher				.685	.361	
Asociación lineal por lineal	.539 ^c	1	.463	.685	.361	.236
N de casos válidos	35					

Through a x2 analysis as shown in Table 1, the dependence and independence of the students' scores with quality and non-quality abdominal wall closures were sought. In this case, since $X^2 = 0.555$, $df=1$, $p= 0.456$, since the significance is greater than 0.05, the H_0 is accepted, so the quality of the abdominal wall closure is independent of its qualification.

4. Discussion

It has been well supported by the group of Dr. Ribeiro Pedroso regarding the reconstruction of the abdominal wall. It is a physiological challenge to maintain the characteristics that allow it once again to be a continent structure of the abdominal viscera (5) ; hence our insistence on creating this concept based on sensitive evidence in the real practice of undergraduate students (1) , prior to their incorporation to the clinical stages, in order to develop this ability.

Although in the case of Dr. Pedroso's project a pig model was used, our objective was not to support a hermetic closure with the use of a dynamometer, but to make a quantitative evaluation according to the teaching models of Drs. Anaya (8) . , Serrano (7) and Gámez-Huerta (9) ; therefore, we were interested in evaluating the development of skills in undergraduate students. In accordance with Dr. Dávila-Serapio's proposal, five sessions were established to establish the learning curve for skill mastery. In our case, it was empirically established that a level of closure could be obtained on the same or model. by undergraduate students, in the third session. Having established the learning curve, the evaluation that we describe was carried out where not all the students managed to master the practice described, despite having the supervision of a certified surgeon, it was found that the students did not fully manage to develop the skill. , being only 65.7% of 35 quality students. Although the objective was to describe the quality of closure, it struck us that, after partial dehiscence of the wound in poor quality copings, there were bruises and a higher closure of the edge and not a perfect horizontal level of closure of the wound. wall (25% of inadequate closures). Finally, of the objective of our study, an adequate closure was given with an independent status of its qualification with $X^2 = 0.555$, $df=1$, $p= 0.456$, as the significance is greater than 0.05, accepting the null hypothesis.

5. Conclusions

- The adequate closure of the wall by our group in one of the practices carried out routinely, can tell us about the degree of mastery of the technique by undergraduate students.
- A quality closure was achieved with evidence, being much more specific and quantitative, it allowed us to be more critical and have quantitative evidence.
- Finally, these wall closure defects will be prevented, which will allow the undergraduate student to create a clinical criterion for use in their practice from the undergraduate internship that allows them to develop other clinical skills.

Financing: "There has been no financing"

Declaration of conflict of interest: "The authors declare that they have no conflict of interest."

Author contributions : Fátima MDR Gonzalez Lee Chong: Creation of the research design and protocol, statistical analysis. Carlos Agustín Rodríguez Paz: methodological advisor and head of the experimental surgery course. Alexia Margarita Moreno Ruiz and Luis Gerardo Sánchez de Alba: data collection and emptying into the database. Kevin Ramírez Ramos: theoretical guidelines.

References

1. Hernandez-Centeno R, Rodríguez-Varela M, Rodríguez-Paz C. Nuevos caminos en la educación quirúrgica. 3rd ed. Tratado de Cirugía General. Distrito Federal: Manual Moderno; 2017. 117–118 p.
2. Torres RA, Orban RD, Serra EE, Marecos MC, Vargas L, Deffis LI, et al. Enseñanza de técnicas quirúrgicas básicas en simuladores biológicos: Experiencia pedagógica en el pregrado. Educ Médica. 2003;6(4):149–52. https://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1575-18132003000500007
3. Padilla L, Argüero R, Di Silvio M, López-Gutiérrez J, Landero T, García J, et al. Curso de microcirugía vascular: 40 años en el Centro Médico Nacional 20 de Noviembre del Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado y 33 años en la Facultad de Medicina de la Universidad Nacional Autónoma de México. Cirugía y Cirujanos. 2019; 86(2): 196–203. <https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=82933>
4. Abreu Hernández LF, Cid García AN, Herrera correa G, Lara Vélez JVM, Laviada Delgadillo R, Rodríguez Arroyo C, et al. Perfil por Competencias del Médico General Mexicano. Director. 2008;1–44. <http://dcs.uqroo.mx/documentos/competenciasmedicogeneralmexicano.pdf>
5. Pedroso AR, de Melo RM, de Oliveira EC. Relaxation incisions and tensile strength in the abdominal wall of pigs. Acta Cir Bras. 2019;34(6). <https://doi.org/10.1590/s0102-865020190060000008>
6. Dávila Serapio F, Rivera Cruz JM, Sánchez González DJ. Aprendizaje de habilidades básicas de cirugía laparoscópica en estudiantes de pregrado de la Escuela Médico Militar. Rev Mex Cirugía Endoscópica. 2008; 9(1):27–34. <https://www.medigraphic.com/pdfs/endosco/ce-2008/ce081e.pdf>
7. Serrano-Martínez P, Nava-García JA, Rodríguez-García A, Páez-Garza JH. Evaluación del desarrollo de habilidades y destrezas quirúrgicas en cirugía de catarata por residentes e instructores, empleando el Simulador de Cirugía EyeSi®. Rev Mex Oftalmol. 2010;84(1):19–24. <https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=24056>
8. Anaya-Prado R, Ortega-León LH, Ramírez-Solis ME, Vázquez-García JA, Medina-Portillo JB, Ayala-López EA. Evaluación de competencias quirúrgicas. Estudio piloto mexicano. Cir Cir. 2012;80(3):261–9. <https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=35349>
9. Gámez-Huerta VH, Martínez-Hernández CD, Rodríguez-Paz CA. Quirúrgico de enseñanza en extracción de lipomas. Cir Gen. 2018;40(2):70–7. <https://www.scielo.org.mx/pdf/cg/v40n2/1405-0099-cg-40-02-70.pdf>
10. Bustamante Z M. Desafíos en la formación del cirujano. Rev Chil Cirugía. 2000;67(4):348–9. <https://www.scielo.cl/pdf/rchcir/v67n4/art01.pdf>
11. Saldarriaga MPJ, BravoMGR, Loor MMR. La teoría constructivista de Jean Piaget y su significado. Ciencias Soc y Polit. 2016;2(dic):127–37. <https://dialnet.unirioja.es/descarga/articulo/5802932.pdf>
12. Tovar J, García G. Investigación en la práctica docente universitaria. Educ Pesqui. 2012;881–95. <https://www.redalyc.org/articulo.oa?id=29824610004>
13. Zerhouni YA, Abu-Bonsrah N, Mehes M, Goldstein S, Buyske J, Abdullah F. General surgery education: a systematic review of training worldwide. Lancet. 2015;385:S39. [https://doi.org/10.1016/s0140-6736\(15\)60834-0](https://doi.org/10.1016/s0140-6736(15)60834-0)
14. García-Partida JA, Berrocoso E, Micó JA. Experimental models for pain evaluation in osteoarthritis. Rev la Soc Esp del Dolor. 2021;28:18–30. <https://dx.doi.org/10.20986/resed.2021.3872/2020>

15. Sáenz Medina J, Asuero de Lis MS, Correa Gorospe C, Cuevas B, Gómez Dos Santos V, Linares Quevedo AI, et al. Modelos experimentales para la investigación y el entrenamiento en trasplante renal. *Actas Urológicas Españolas*. 2008;32(1). <https://scielo.isciii.es/pdf/aue/v32n1/v32n1a09.pdf>
16. Rodríguez-Paz C, Carreón-Bringas R, Ortega-Salgado J. Cajón de cirugía, modelo didáctico en las técnicas de nudos y afrontamiento. *Rev Medica Hosp Gen México*. 1993;56(1). <https://pesquisa.bvsalud.org/portal/resource/%20es/lil-134974>
17. Asociación Médica Mundial. Declaración de la Asociación Médica Mundial sobre el uso de animales en la investigación biomédica. 203 sesión del Cons del AMM. 2016;01-2. <https://www.wma.net/es/policies-post/declaracion-de-la-amm-sobre-el-uso-de-animales-en-la-investigacion-biomedica/>
18. Ochoa L. Norma Oficial Mexicana, Especificaciones técnicas para la producción, cuidado y uso de los animales de laboratorio. Nom-062-Zoo. 1999;1-58. https://www.gob.mx/cms/uploads/attachment/file/203498/NOM-062-ZOO-1999_220801.pdf
19. Unión C de diputados del HC de la. Reglamento de la Ley General de Salud en Materia de Investigaciones para la Salud. Ley Gen Salud. 1987;DOF 02-04-:1-31. https://www.diputados.gob.mx/LeyesBiblio/regley/Reg_LGS_MIS.pdf



© 2022 University of Murcia. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution-NonCommercial-No Derivative Works 4.0 Spain license (CC BY-NC-ND) (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).