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ORIGINAL ARTICLE

In vivo experience with peroral endoscopic myotomy: An essential activity for developing the technique in humans☆

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KEYWORDS
Endoscopic esophagomyotomy;
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Abstract
Introduction and objectives: Achalasia is the most widely studied esophageal motility disorder. No treatment has achieved completely satisfactory results. The laparoscopic Heller esophagomyotomy is currently the most accepted technique. With the advent of minimally invasive surgery, the appearance of peroral endoscopic myotomy (POEM) has promising results. The primary aim of our study was to perform peroral endoscopic esophagomyotomy in animal experimentation models to perfect the technique and later apply it to humans. The secondary aims were to evaluate the intraoperative and postoperative complications and to describe the anatomopathologic findings.
Materials and methods: An experimental study was conducted on 8 live porcine models that were followed for 30 days to identify postoperative complications. Necropsy was then performed to evaluate the histopathologic findings. The international requirements and regulations for animal experimentation were met.
Results: The technique was carried out in all the models. There was one intraoperative death. Pneumothorax was observed in 50% of the units in experimentation and subcutaneous cervical emphysema in 75%, with no significant clinical repercussions. Histologic muscle layer (myotomy) involvement was above the gastroesophageal junction in 87% of the cases and below it in 25%.

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Conclusion: Peroral endoscopic esophagomyotomy is a feasible, albeit complex, procedure that requires advanced training, and thus should be performed in highly specialized centers. Specific skills in advanced therapeutic endoscopic procedures of this type must continue to be developed through continuing education (ideally in *in vivo* models), to then be performed on humans.

PALABRAS CLAVE
Esofagomiotomía endoscópica;
Modelos *in vivo*;
Acalasia

Miotomía endoscópica peroral, experiencia *in vivo*: imprescindible para desarrollo de la técnica en humanos

Resumen
Introducción y objetivos: La acalasia es el trastorno de motilidad esofágica más estudiado; ningún tratamiento ha logrado resultados completamente satisfactorios. La esofagomiotomía de Heller por laparoscopia es la técnica más aceptada en la actualidad. Con el advenimiento de la cirugía mínimamente invasiva, aparece la miotomía endoscópica submucosa con resultados prometedores. Nuestro objetivo principal de este estudio fue realizar miotomía endoscópica submucosa en modelos de experimentación animal, para perfeccionar la técnica y posteriormente aplicarla en humanos. Como objetivo secundario se buscó evaluar las complicaciones intra y postoperatorias, así como describir los hallazgos anatomopatológicos encontrados.
Materiales y métodos: Se realizó un estudio experimental en 8 modelos porcinos vivos, que se siguieron durante 30 días para identificar complicaciones posoperatorias. Posteriormente se practicó necropsia evaluando los hallazgos histopatológicos. Se cumplieron los requisitos y regulaciones internacionales de experimentación en animales.
Resultados: Se logró realizar la técnica en todos los modelos. Se presentó una mortalidad intraperatoria. Se observó neumotórax en el 50% y enfisema subcutáneo en el 75% de las unidades de experimentación, sin repercusión clínica significativa. Se observó compromiso histológico de la capa muscular (miotomía) por encima de la unión esofagogástrica en el 87% de los casos y por debajo de esta en el 25% de los casos.
Conclusión: La esofagomiotomía endoscópica submucosa es un procedimiento factible pero complejo que requiere un entrenamiento avanzado, y dadas sus características debe ser realizado en centros de alta complejidad. Es necesario seguir desarrollando destrezas específicas, mediante educación continuada (idealmente en modelos *in vivo*), en procedimientos endoscópicos terapéuticos avanzados de este tipo, para posteriormente ser desarrollados en humanos.

Introduction and aims

Achalasia is the best-described esophageal motility disorder. It is a disease of unknown pathophysiology that significantly compromises patient quality of life, for which there is no curative treatment.[1] Laparoscopic Heller myotomy associated with partial fundoplication is the surgical treatment of choice, even though there are some alternatives that offer similar results, such as endoscopic pneumatic balloon dilation.[2,3] The technique of endoscopic botulinum toxin injection, widely used in patients that are not candidates for surgical management, has limitations regarding costs and the need for numerous procedures, as well as varying results. The development of therapeutic endoscopy and the ever-increasing knowledge about the deep layers of the gastrointestinal tract, has made the concept of natural orifice translumenal endoscopic surgery possible.[4] This is how peroral endoscopic esophagomyotomy (POEM) emerged as a management alternative, demonstrating similar, and even superior, results to the current techniques.[5,6]

POEM has been evaluated in pigs and in humans. The potential benefits of this technique are less postoperative pain, reduced incision-derived complications, shorter hospital stay, and better cosmetic results.[3,6] Endoscopic submucosal dissection (ESD) is the basic technique for the development of POEM.[7,8] In Colombia, experience with ESD has been reported on,[7,8] but up to now, no experience with POEM has been published in either animal or human experimental models.

The use of *in vivo* experimental models is important in the research on and development of special medical surgical techniques. The purpose of this type of work is to improve skills and gain experience in the performance of POEM, in the hope of establishing it as the management of choice for achalasia.[9,10]