

AS1-1

### Genomics analysis to the pathogenesis in adult inguinal hernia

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**Objective:** To explore the genomics change in the occurrence and development of adult primary inguinal hernia.

**Methods:** From June 2014 to June 2015, we collected transversalis fascia of 5 patient with inguinal hernia and 5 matched control patients, utilizing gene chips (Affymetrix GeneChip Human Transcriptome Array 2.0) to reveal gene expression profiling.

**Results:** 1189 mRNAs were showed differently expressed in hernia patients relative to their matched control, with 877 mRNAs upregulated and 312 mRNAs downregulated.

**Conclusion:** The occurrence and development of inguinal hernia is associated with a multitude of genetic expression. By selecting target differently expressed genes based on the gene array analysis, we can further explore the pathogenesis and mechanism of inguinal hernia development.

AS1-2

### A detailed anatomical concept of the inguinal structure recognized on High-vision images of the totally extra-peritoneal repair procedures with tumescent anesthesia of inguinal hernia

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Inguinal hernia repair is the most common procedure performed worldwide in general surgery. Although the extra-peritoneal approach (TEP), a laparoscopic hernia-plasty method, has gained in popularity and recommended by the European Hernia Society, TEP is a challenging technique with unfamiliar anatomy of poorly depicted anatomical guides. A more precise anatomical concept of the inguinal structure recorded on High-vision images of the TEP procedures with tumescent anesthesia of inguinal hernia is mentioned. Under the attenuated posterior rectal sheath which continues to the membranous fascia on the posterior rectal sheath and links to the umbilical pre-vesicular fascia, pre-peritoneal space exists. In this space, the pre-peritoneal fascia which contains the hernia sac and spermatic sheath with the ductus deferens and testicular vessels, penetrate the inguinal ring.

This is different from current anatomical descriptions. This concept, identical to the view recorded in the anterior procedures, is available to perform TEP procedure.

AS1-3

### Key points on the surgical procedure of midline approach TEP (Totally ExtraPeritoneal Repair): an optimal approach for single port surgery

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In laparoscopic inguinal hernia hernioplasty, TEP is operated without cumbersome procedures such as the peritoneal incision and suture, and TEP is in particular suited for SILS.

In the midline approach where the linea alba is incised to enter the space between the peritoneum and the posterior rectus sheath, the peritoneal side is expanded by carbon dioxide insufflation and a wide working space can be secured with the Retzius space formed between the transversalis fascia and preperitoneal space.

The midline approach TEP is considered to have a significant advantage for SILS in terms of the utilization of a wide working space as well as the merit that the peritoneal repair is unnecessary.

In the midline approach TANKO-TEP, key points on the surgical procedure are as follows: (1) correct incision along the linea alba, development of the Retzius space which will serve as a working space, and establishment of the umbilical platform, (2) confirmation of landmarks between the Retzius space and preperitoneal space bearing in mind a three-dimensional image of the extraperitoneal space, (3) penetration into the preperitoneal space, parietalization, and inspection of the membranous layer (i.e., the superficial layer) in the boundary surface of the preperitoneal space, and (4) securing a space for handling the mesh.

It is also important to understand the three-dimensional structure consisting of the transversalis fascia and the preperitoneal space, forming the extraperitoneal space between the body-wall muscles and peritoneum, and the Retzius space, the artificial cavity formed between the transversalis fascia and preperitoneal space.

AS1-4

## The clinical observation of fascia characteristics in TEP procedure

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**Background & Purpose:** Young surgeons often have inadequate understanding the proper anatomical planes for dissection in TEP procedures, this may either due to the limited, and less agreement among the definition, nature, extent, attachments or functions of the transversalis fascia, or the variations of these structures from patient to patient. We provide here the clinical observations of the various preperitoneal planes during TEP procedure, and it is important for better understanding the knowledge.

**Methods:** Pictures and video clips of TEP procedure were recorded during operation, the uncommon findings and typical anatomical structures were also noticed. Literatures were reviewed.

**Results:** There are some variations in the anatomical structures of the preperitoneal space. Transversalis fascia was also found quite distinct from the preperitoneal fascia which ensheathed the cord structures and hernia sac. The Transversalis fascia and the preperitoneal fascia are different in origin with separate individual neurovascular supply. Some patients had complete posterior rectus sheath, extending to the pubic bone, and made the Arcuate line formed on various levels. And this sheath should be incised to create a proper space during TEP.

**Conclusion:** There is an avascular inter-fascial plane between the transversalis fascia and the preperitoneal fascia, which is the surgical preperitoneal space, and some common anatomical variations should be anticipated and respected during TEP procedure.

AS1-5

## A Comprehensive New Definition and New Classification for Corona Mortis: A Clinical View

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**Background:** Although it is famous as an anatomical term, Corona Mortis (CMOR) as a non-standard vascular anatomy, there are no clear definition including possible localizations and related classification of CMOR. Here we provide a new and comprehensive definition for CMOR and a classification including possible localizations.

**Material:** The patients who underwent totally extraperitoneal (TEP) hernia repair from July 2014 to February 2016 were evaluated.

**Results:** 190 of 83 patients were considered. Three zones were described for the localization of CMOR. Zone I: The area on the posterior surface of superior pubic ramus between medial border of inferior epigastric vessels and the lateral border of Cooper's ligament (35%). Zone II: The area on the surface of Cooper's ligament (32%). Zone III: The area on the body of pubic bone medially to medial border of Cooper's ligament (28%).

**Conclusion:** The vessels derived from inferior epigastric vessels or obturator vessel crossing the body of pubic bone to make an anastomosis with the vessels originated from the contralateral equivalents were firstly identified in the current study. A new definition and a new classification of CMOR based on clinically important localisations were gained to the medical literature with this study.

AS1-6

## A New Maneuver to View and to Protect Corona Mortis During Laparoscopic Totally Extraperitoneal Hernia Repair

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**Background:** The identification of retropubic vasculature is not easy under the pressure of insufflated gas during totally extraperitoneal (TEP) inguinal hernioplasty. We aimed to present the usefulness of a maneuver that allow the clear identification of retropubic vasculature.

**Methods:** Vascular anatomy on the retropubic surface in 364 patients who underwent the TEP procedure from January 2005 to September 2015 were evaluated. In patients after July 2014, the pressure in the workspace was decreased from 14 mmHg to 8 mmHg before fixation of the mesh to clearly identify the veins. The results before and after July 2014 were compared.

The number of hemipelvises in the first and second periods were 398 and 77, respectively. The rate of identification of venous corona mortis was 31% in the second period, whereas it was 1.0% in the first period ( $p=0.000$ ). The identification of thick (5.5% vs. 10.3%;  $p=0.123$ ) and thin (22.8% vs. 36.3%;  $p=0.014$ ) arterial structures and their sum were increased in the second period (28.4 vs. 46.7%;  $p=0.002$ ). The rate of retropubic bleeding was zero in the second period, while it was 1.5% in the first period.

During TEP hernioplasty, the pressure of insufflated gas more than 10 mmHg in the preperitoneal space hinders the correct identification of vessels on the retropubic surface. The proposed maneuver, to decrease the pressure in the workspace to 8 mmHg, can provide clear identification of all vessels, which decreases the potential risk of vascular injury.