Mahidol University
Faculty of Medicine Ramathibodi Hospital
Department of Clinical Epidemiology and Biostatistics

Special Workshop

AI Assistance in Conducting Systematic Review

21 November 2025 2:30 – 16.00

What is Artificial Intelligence (AI)?

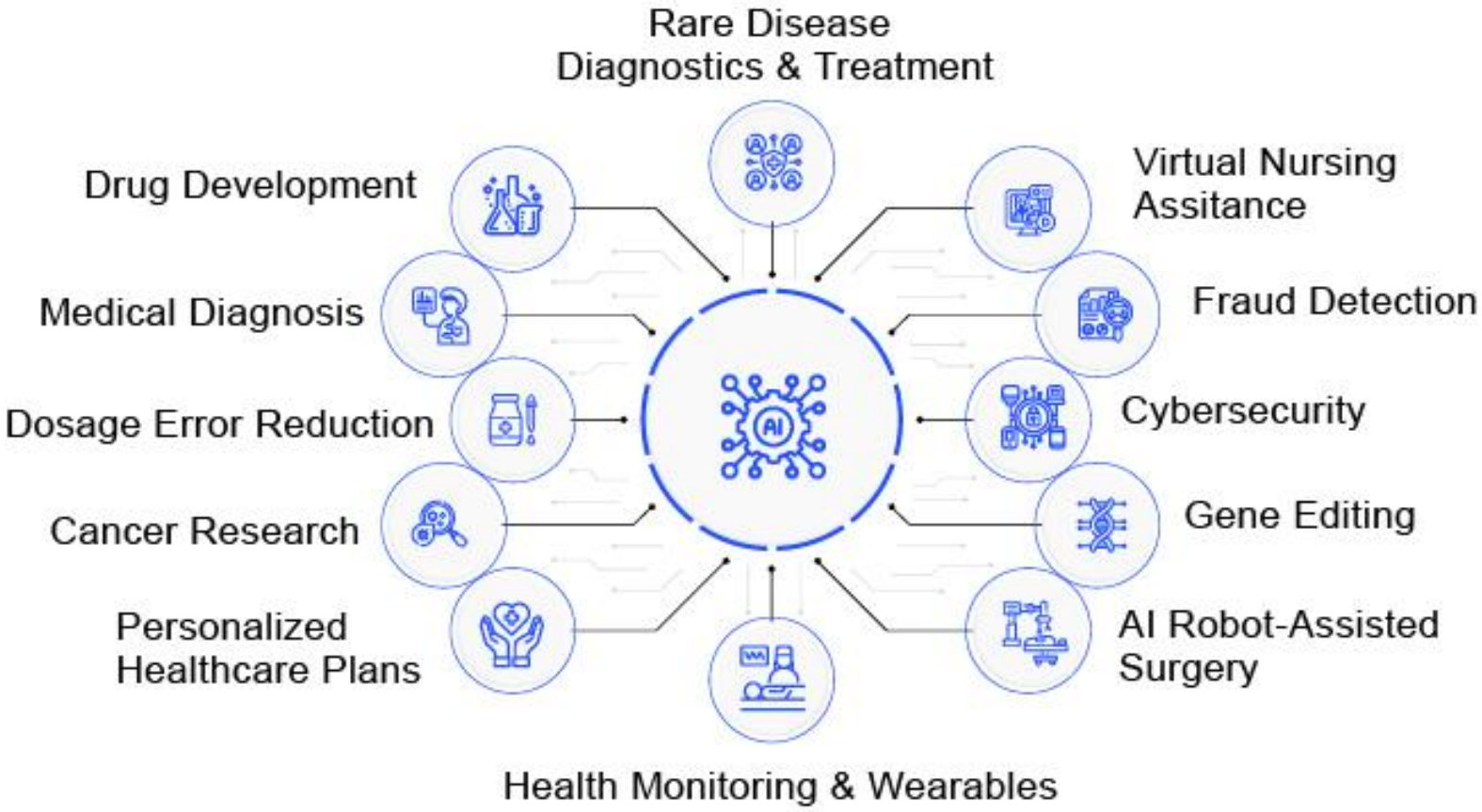
AI refers to

"The development of computer systems capable of performing tasks that typically require human intelligence, such as problem-solving, learning, and decision-making."

What is AI?

- AI simulates human thinking
  - E.g., decision-making, learning
- AI is not just robot
  - Works through algorithms, logic, and data
- Goal is to assist human experts, not replace them
- Widely used since 1970s
  - E.g., MYCIN, ECG interpretation

AI in Healthcare



https://www.delveinsight.com/blog/top-applications-of-artificial-intelligence-in-healthcare

What is Systematic Review (SR)?

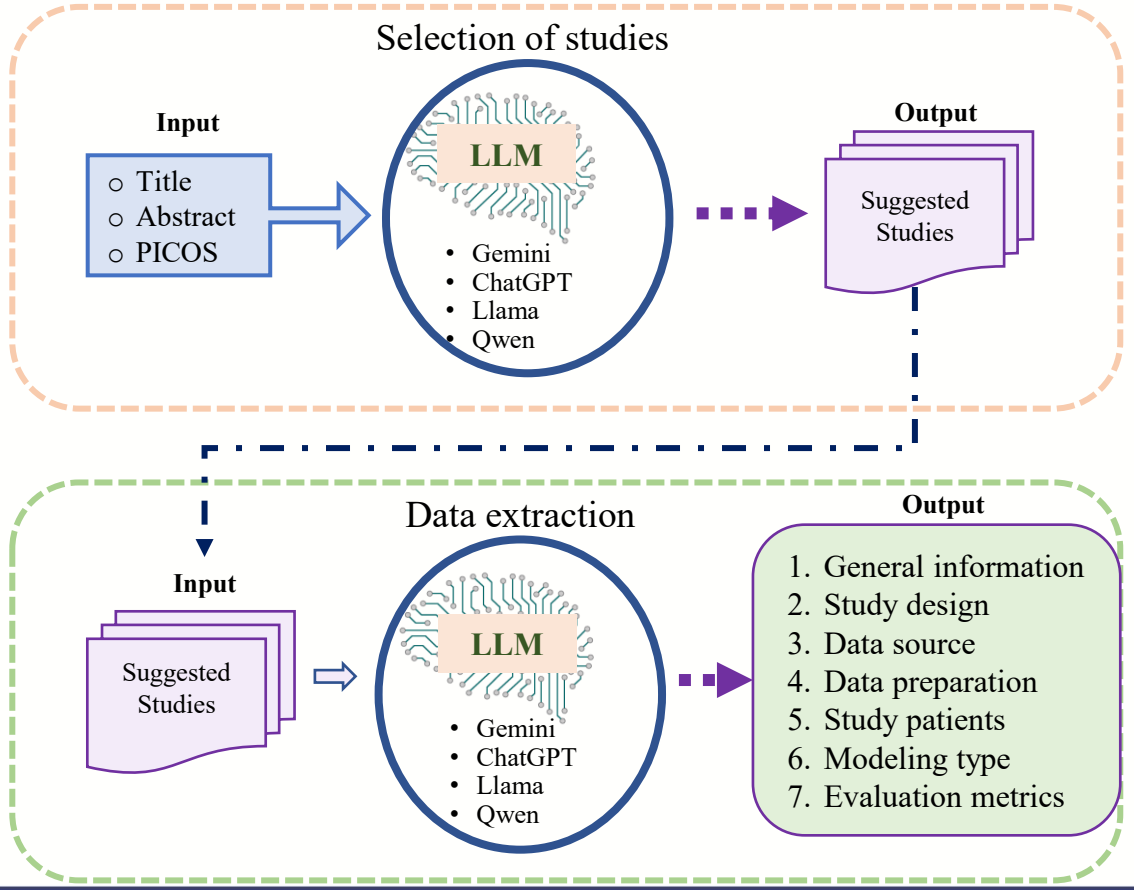
- Rigorous and comprehensive method to synthesize existing research findings on a specific topic or question.
- Commonly used in healthcare and other fields to inform decision-making, policy development, and further research.

SR processes

Systematic Review with AI (SRAI)

Develop AI tools for study selections, risk of bias, and data extractions for systematic review

- Few-Shot learning
- Applying LLM



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- Rigorous and comprehensive method to synthesize existing research findings on a specific topic or question.
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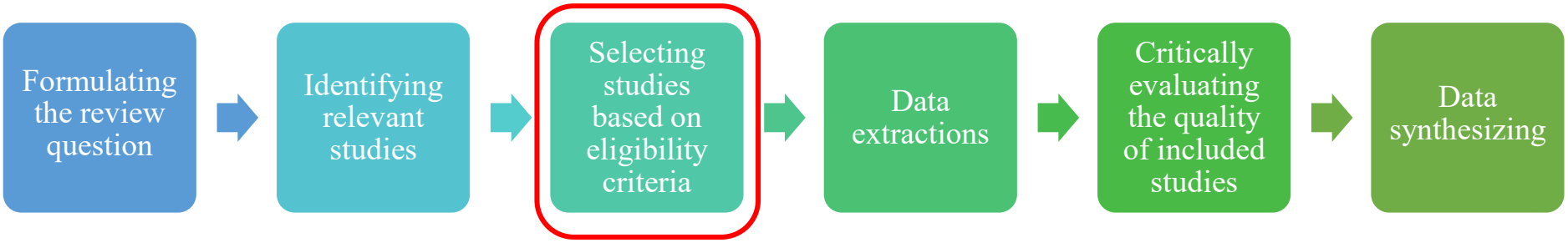
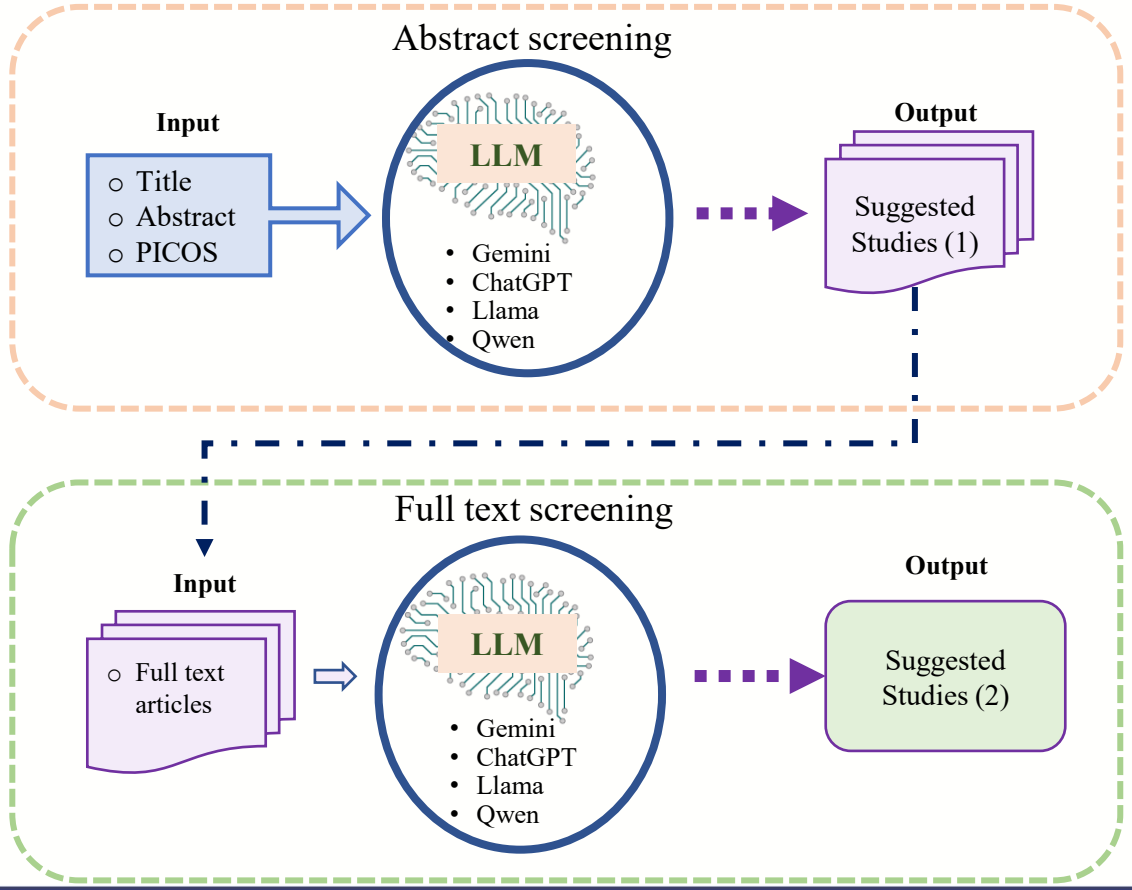
SR processes



Systematic Review with AI (SRAI)

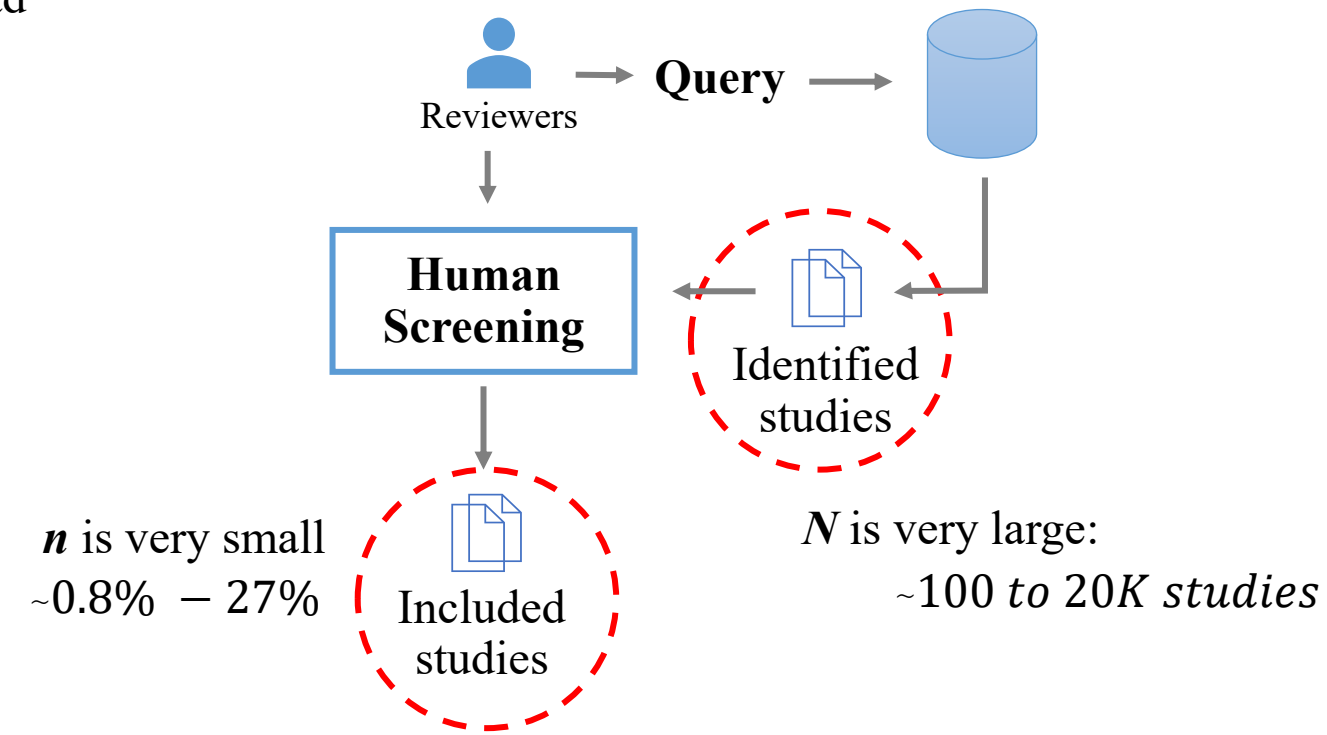
AI tools for study selections

- Abstract screening
- Full text screening



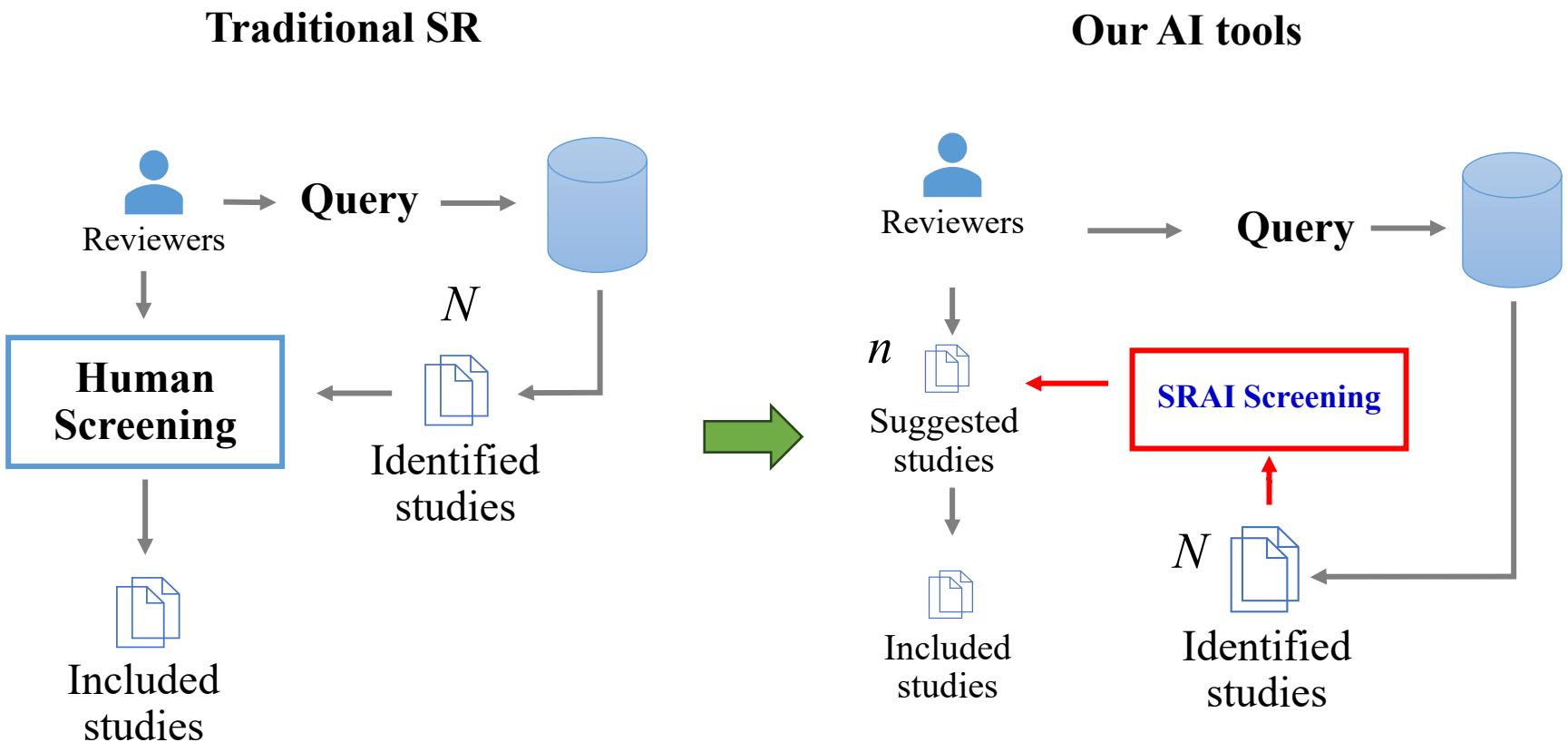
The challenges in SR

- Workload



1) Kontonatsios G, et al., 2020

SRAI helping in reduce screening workload



Example project

Mesh position for hernia prophylaxis after midline laparotomy: A systematic review and network meta-analysis of randomized clinical trials

PICOS

P

- Adults
- Patient who underwent abdominal surgery
- Patient who operated via a midline incision
- Not involve secondary abdominal fascia closure or laparoscopic incisions

I&C

- Compared at least two abdominal wall closure techniques (Onlay mesh, Retrorectus mesh, Preperitoneal mesh, Intraperitoneal mesh, and Primary suture closure)

O

- At least one of the primary (incisional hernia) or secondary outcomes (wound infection, seroma, hematoma, dehiscence, acute postoperative pain, chronic pain, abdominal closure time, and mesh removal rate)

S

- Randomized controlled trial

Test with LLMs on 5 samples

- **Ineligible studies(3)**
  - Prophylactic mesh can be used safely in the prevention of incisional hernia after bilateral subcostal laparotomies
  - Interrupted versus continuous fascial closure in patients undergoing emergent laparotomy: A randomized controlled trial
  - Randomized, Controlled, Prospective Trial of the Use of a Mesh to Prevent Parastomal Hernia

- **Eligible studies (2)**
  - Long-term results of a prospective randomized trial of midline laparotomy closure with onlay mesh
  - Prevention of incisional hernia with prophylactic onlay and sublay mesh reinforcement versus primary suture only in midline laparotomies (PRIMA): 2-year follow-up of a multicentre, double-blind, randomised controlled trial

Prophylactic mesh can be used safely in the prevention of incisional hernia after bilateral subcostal laparotomies

Input title and abstract

Prophylactic mesh can be used safely in the prevention of incisional hernia after bilateral subcostal laparotomies

Luis Alberto BlSOHazquez Hernando, MD,a Miguel SOHA ngel GarcSOHÄ±a-Ure~na, MD, PhD,a Javier LSOHopez-MonclSOHus, MD, PhD,b Santiago GarcSOHÄ±a HernSOHandez, MD,b SOHA lvaro RobSOHÄ±n Valle de Lersundi, MD, PhD,a Arturo Cruz Cidoncha, MD, PhD,a Daniel Melero Montes, MD,a Camilo CastellSOHon PavSOHon, MD, PhD,c Enrique GonzSOHalez GonzSOHalez, MD, PhD,a and Natividad Palencia GarcSOHÄ±a, MD,a Madrid, Spain

Background. The use of prophylactic mesh to prevent incisional hernia is becoming increasingly common in midline laparotomies and colostomies. The incidence of incisional hernia after subcostal laparotomies is lower than after midline incisions. Nevertheless, the treatment of subcostal incisional hernia is considered to be more complex. Currently, there are no published data about mesh augmentation procedures to close these laparotomies.

Methods. This was a longitudinal, prospective, cohort study of patients undergoing a bilateral subcostal laparotomy in elective operations. The mesh group was a group of patients operated consecutively between 2011 and 2013 with a prophylactic self-fixation mesh. The control group was selected from a retrospective analysis of patients operated between 2009 and 2010 and closed with a conventional protocol of 2-layer closure. The incidence of incisional hernia was recorded both clinically and radiologically for 2 years.

Results. A total of 57 patients were included in the control group and 58 in the mesh group. Most patients underwent gastric, hepatic, and pancreatic operations. Both groups were homogeneous in terms of their clinical and demographic characteristics. Operative time and hospital stay were similar in both groups. Both groups had a comparable rate of local and systemic complications. Ten patients (17.5%) in the control group developed an incisional hernia, and only 1 patient (1.7%) in the mesh group developed an incisional hernia (P = .0006).

Conclusion. The incidence of incisional hernia after a conventional closure of bilateral subcostal laparotomy is significant. The use of a mesh augmentation procedure for closing bilateral subcostal laparotomies is safe and may reduce the incidence of incisional hernia. (Surgery 2016;160:1358-66.)

From the Department of Surgery,a Henares University Hospital, Francisco de Vitoria University, the Department of Surgery,b Puerta de Hierro University Hospital, Universidad AutSOHonoma, and the Department of Surgery,c Infanta Elena University Hospital, Francisco de Vitoria University, Madrid, Spain

Interrupted versus continuous fascial closure in patients undergoing emergent laparotomy: A randomized controlled trial

BACKGROUND: The optimal method of fascial closure, interrupted fascial closure (IFC) versus continuous fascial closure (CFC) has never been studied exclusively in the setting of emergency surgery.We hypothesized that IFC decreases postoperative incisional hernia development following emergent laparotomies.
METHODS: Between August 2008 and September 2015, patients undergoing emergent laparotomieswere consented and randomly assigned to either IFC or CFC.Patientswere followed up postoperatively for at least 3months and assessed for incisional hernia, dehiscence, or wound infection.We excluded those with trauma, elective surgery, mesh in place, primary ventral hernia, previous abdominal surgery within 30 days, or those not expected to survive for more than 48 hours. Our primary endpoint was the incidence of postoperative incisional hernias.
RESULTS: One hundred thirty-six patients were randomly assigned to IFC (n = 67) or CFC (n = 69). Baseline characteristics were similar between the groups. No difference was noted in the length of the abdominal incision, or the peak inspiratory pressure after the closure. The median time needed for closurewas significantly longer in the IFC group (22 minutes vs. 13 minutes, p < 0.001). Thirtyseven (55.2%) IFC and 41 (59.4%) CFC patients completed their follow-up visits. There was no statistically significant difference in baseline and intraoperative characteristics between those who completed follow-ups and those who did not. The median time from the day of surgery to the day of the last follow-up was similar between IFC and CFC (233 days vs. 216 days, p = 0.67), as were the rates of incisional hernia (13.5%versus 22.0%, p = 0.25), dehiscence (2.7% vs. 2.4%, p = 1.0), and surgical site infection (16.2% vs. 12.2%, p = 0.75).
CONCLUSION: There was no statistically detectable difference in postoperative hernia development between those undergoing IFC versus CFC after emergent laparotomies. However, this may be due to the relatively low sample size. (J Trauma Acute Care Surg. 2018;85: 459â€"465. Copyright Â© 2018 American Association for the Surgery of Trauma. All rights reserved.)
LEVEL OF EVIDENCE: Therapeutic/Care Management Study, level III.
KEYWORDS: Fascial closure; emergency surgery; acute care surgery; laparotomy.

Randomized, Controlled, Prospective Trial of the Use of a Mesh to Prevent Parastomal Hernia

Input title and abstract

Randomized, Controlled, Prospective Trial of the Use of a Mesh to Prevent Parastomal Hernia

Xavier Serra-Aracil, MD,* Jordi Bombardo-Junca, MD,* Juan Moreno-Matias, MD,* Anna Darnell, MD,â€ Laura Mora-Lopez, MD,* Manuel Alcantara-Moral, MD,* Isidro Ayguavives-Garnica, MD,* and Salvador Navarro-Soto, MD*

Background: The prevalence of terminal parastomal hernia (PH) after colostomy placement may be as high as 50%. The effect of the PH may range from discomfort to life-threatening complications. Surgical procedures for repairing PH are difficult to perform and present a high-failure rate.

Objective: To reduce the incidence of PH by implanting a lightweight mesh in the sublay position.

Material and Methods: Randomized, controlled, prospective study. Patients were scheduled for permanent end colostomy surgery to treat cancer of the lower third of the rectum, performed by the same colorectal surgery team. An Ultrapro lightweight mesh was inserted in the sublay position in the study group. Using simple randomization, the sample size required was estimated to be 27 per group. Patients were followed-up clinically and radiologically with abdominal computed tomography by an independent clinician and a radiologist who were all blind to the aims of the study, 1 month and every 6 months after surgery.

Results: The groups were homogeneous in terms of their clinical and demographic characteristics. Surgical time and postoperative morbidity were similar in the 2 groups. Mortality was 0. No mesh intolerance was reported. In the clinical follow-up (median: 29 months, range: 13â€“49), 11/27 (40.7%) hernias were recorded in the control group compared with 4/27 (14.8%) in the study group (P SOH 0.03). Abdominal computed tomography identified 14/27 (44.4%) hernias in the control group compared with 6/27 (22.2%) in the study group (P SOH 0.08).

Conclusions: Parastomal placement of a mesh reduces the appearance of PH. The technique is safe, well-tolerated, and does not increase morbidity rates.

Long-term results of a prospective randomized trial of midline laparotomy closure with onlay mesh

Input title and abstract

Long-term results of a prospective randomized trial of midline laparotomy closure with onlay mesh

A. Caroâ€'Tarrago1 Â· C. Olona1 Â· M. MillÃ¡n1 Â· M. Olona2 Â· B. Espina1 Â· R. Jorba1

Received: 6 September 2018 / Accepted: 14 January 2019 / Published online: 30 January 2019

Abstract

Purpose Incisional hernia (IH) continues to be one of the most common complications of laparotomy. The short-term protective effect of the use of mesh has been demonstrated in several studies. At present, there is little evidence on the long-term results of the prophylactic use of mesh. The aim of the present study is to analyze the long-term prevention of IH 5 years after a midline laparotomy during elective surgery.

Methods A prospective study was performed including all of the 160 patients that had been previously included in the prospective, randomized, controlled trial performed between May 2009 and November 2012. The protocol and results at 1 year have been previously published in 2014. The patients in group A (mesh) were fitted with a polypropylene mesh to reinforce the standard abdominal wall closure. The patients in group B (non-mesh) underwent a standard abdominal wall closure and were not fitted with the mesh. All patients were followed for 5 years or until the diagnosis of incisional hernia was made, further surgery was performed, or the patient died. Cases lost to follow-up were also registered.

Results Five years after surgery, in group A (mesh) we have found 4/80 (5.1%) incisional hernias, while in group B (no mesh) 37/80 patients were diagnosed with an incisional hernia (46.8%). The Kaplanâ€"Meier survival curves for these results show statistically significant differences ($p > 0.001$).

Conclusion The protective effect of the use of an onlay mesh in abdominal wall closure is significantly maintained in the long-term, up to 5 years after surgery.

International Standard Randomized Controlled Trial number: ISRCTN98336745.

Keywords Incisional hernia Â· Polypropylene mesh Â· Prevention

Prevention of incisional hernia with prophylactic onlay and sublay mesh reinforcement versus primary suture only in midline laparotomies (PRIMA): 2-year follow-up of a multicentre, double-blind, randomised controlled trial

Input title and abstract

Prevention of incisional hernia with prophylactic onlay and sublay mesh reinforcement versus primary suture only in midline laparotomies (PRIMA) 2-year follow-up of a multicentre, double-blind, randomised controlled trial

An P Jairam, Lucas Timmermans, Hasan H Eker, Robert E G J M Pierik, David van Klaveren, Ewout W Steyerberg, Reinier Timman, Arie C van der Ham, Imro Dawson, Jan A Charbon, Christoph Schuhmacher, AndrÃ© Mihaljevic, Jakob R Izbicki, Panagiotis Fikatas, Philip Knebel,
RenÃ© H Fortelny, Gert-Jan Kleinrensink, Johan F Lange, Hans J Jeekel, for the PRIMA Trialist Groupâ€

Summary

Background Incisional hernia is a frequent long-term complication after abdominal surgery, with a prevalence greater than 30% in high-risk groups. The aim of the PRIMA trial was to evaluate the effectiveness of mesh reinforcement in high-risk patients, to prevent incisional hernia.

Methods We did a multicentre, double-blind, randomised controlled trial at 11 hospitals in Austria, Germany, and the Netherlands. We included patients aged 18 years or older who were undergoing elective midline laparotomy and had either an abdominal aortic aneurysm or a body-mass index (BMI) of 27 kgmÂ² or higher. We randomly assigned participants using a computer-generated randomisation sequence to one of three treatment groups primary suture; onlay mesh reinforcement; or sublay mesh reinforcement. The primary endpoint was incidence of incisional hernia during 2 years of follow-up, analysed by intention to treat. Adjusted odds ratios (ORs) were estimated by logistic regression. This trial is registered at ClinicalTrials.gov, number NCT00761475.

Findings Between March, 2009, and December, 2012, 498 patients were enrolled to the study, of whom 18 were excluded before randomisation. Therefore, we included 480 patients in the primary analysis 107 were assigned primary suture only, 188 were allocated onlay mesh reinforcement, and 185 were assigned sublay mesh reinforcement. 92 patients were identified with an incisional hernia, 33 (30%) who were allocated primary suture only, 25 (13%) who were assigned onlay mesh reinforcement, and 34 (18%) who were assigned sublay mesh reinforcement (onlay mesh reinforcement vs primary suture, OR 0Â·37, 95% CI 0Â·20â€“0Â·69; p=0Â·0016; sublay mesh reinforcement vs primary suture, 0Â·55, 0Â·30â€“1Â·00; p=0Â·05). Seromas were more frequent in patients allocated onlay mesh reinforcement (34 of 188) than in those assigned primary suture (five of 107; p=0Â·002) or sublay mesh reinforcement (13 of 185; p=0Â·002). The incidence of wound infection did not differ between treatment groups (14 of 107 primary suture; 25 of 188 onlay mesh reinforcement; and 19 of 185 sublay mesh reinforcement).

Login

- https://aisr.emergencymed.net/beta/login.php

PICOS

P

- Adults
- Patient who underwent abdominal surgery
- Patient who operated via a midline incision
- Not involve secondary abdominal fascia closure or laparoscopic incisions

I&C

- Compared at least two abdominal wall closure techniques (Onlay mesh, Retrorectus mesh, Preperitoneal mesh, Intraperitoneal mesh, and Primary suture closure)

O

- At least one of the primary (incisional hernia) or secondary outcomes (wound infection, seroma, hematoma, dehiscence, acute postoperative pain, chronic pain, abdominal closure time, and mesh removal rate)

S

- Randomized controlled trial

PICOS (1st draft)

Population (P):

- Adults who underwent **abdominal surgery with midline incision, NOT** secondary abdominal fascia closure or laparoscopic incisions.

Intervention & Comparator (I&C)

- Compared at least two abdominal wall closure techniques (Onlay mesh, Retrorectus mesh, Preperitoneal mesh, Intraperitoneal mesh, and Primary suture closure)

Outcome (O)

- At least one of the primary (incisional hernia) or secondary outcomes (wound infection, seroma, hematoma, dehiscence, acute postoperative pain, chronic pain, abdominal closure time, and mesh removal rate)

Study Design (S)

- Randomized controlled trial

PICOS (1st revision)

Population (P):

- Adults who underwent **abdominal surgery with midline incision, NOT** secondary abdominal fascia closure or laparoscopic incisions.

Intervention & Comparator (I&C)

- Compared any pair of mesh techniques (which are 1. Onlay mesh 2. Retrorectus mesh 3. Preperitoneal mesh, 4 Intraperitoneal mesh), or between any mesh techniques and primary suture closures; BUT not between primary suture closures.

Outcome (O)

- At least one of the primary (incisional hernia that is only occurred at incision wound, NOT include ostomy wound, such as parastomal, obturator hernia) or secondary outcomes (wound infection, seroma, hematoma, dehiscence, acute postoperative pain, chronic pain, abdominal closure time, and mesh removal rate)

Study Design (S)

- Randomized controlled trial

PICOS (2nd revision)

Population (P):

- Adults who underwent abdominal surgery with midline incision (includes midline laparotomy), NOT secondary abdominal fascia closure or laparoscopic incisions.

Intervention & Comparator (I&C)

- Compared any pair of mesh techniques (which are but not limited to 1. Onlay mesh 2. Retrorectus mesh 3. Preperitoneal mesh, 4 Intraperitoneal mesh), or between any mesh techniques and primary suture closures (or no mesh); BUT not between primary suture closures.

Outcome (O)

- At least one of the primary (incisional hernia that is only occurred at incision wound, NOT include ostomy wound, such as parastomal, obturator hernia) or secondary outcomes (wound infection, seroma, hematoma, dehiscence, acute postoperative pain, chronic pain, abdominal closure time, and mesh removal rate)

Study Design (S)

- Randomized controlled trial

PICOS (3rd revision)

Population (P):

- Adults who underwent abdominal surgery with midline incision (includes (emergent) midline laparotomy), NOT secondary abdominal fascia closure or laparoscopic incisions.

Intervention & Comparator (I&C)

- Compared any pair of mesh techniques (which are but not limited to 1. Onlay mesh 2. Retrorectus mesh 3. Preperitoneal mesh, 4 Intraperitoneal mesh), or between any mesh techniques and primary suture closures (or no mesh); **EXCLUDE** comparison between primary suture closures..

Outcome (O)

- Include at least one of the primary (incisional hernia that is only occurred at incision wound, NOT include ostomy wound, such as parastomal, obturator hernia) or secondary outcomes (wound infection, seroma, hematoma, dehiscence, acute postoperative pain, chronic pain, abdominal closure time, and mesh removal rate)

Study Design (S)

- Randomized controlled trial