Università di Napoli "Federico II"
Area Funzionale di Chirurgia Pediatrica

# APPENDICITE ACUTA

**Ciro Esposito**

# CENNI STORICI

- 1735- Cladius Aymant prima descrizione di appendicectomia-Londra
- 1880 Lawson Tait -Londra
- 1883 Abraham Groves- Canada
- 1886 R.H. Fitz
- 1889 Charles Mc Burney New York
- 1904 JB Murphy Chicago

# EPIDEMIOLOGIA

- 0,2 % della popolazione mondiale/anno
- M>F
- Malattia propria dei paesi occidentali
- Ogni anno 50.000 appendicectomie in Italia
- L'appendicite è rara nella prima infanzia è comune nell'adolescenza e raggiunge il picco massimo tra i 15 e i 25 anni.

# ETA'

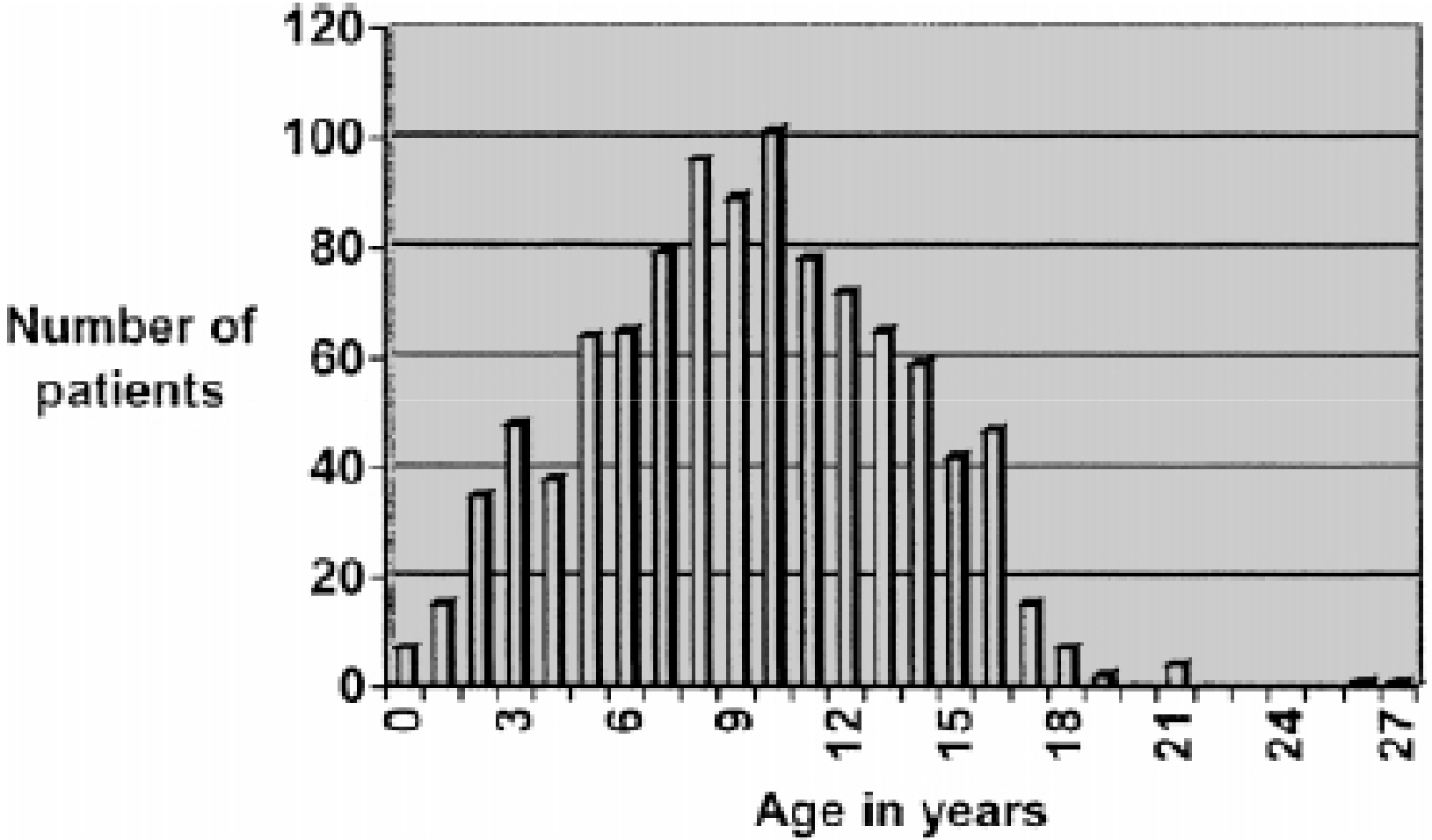
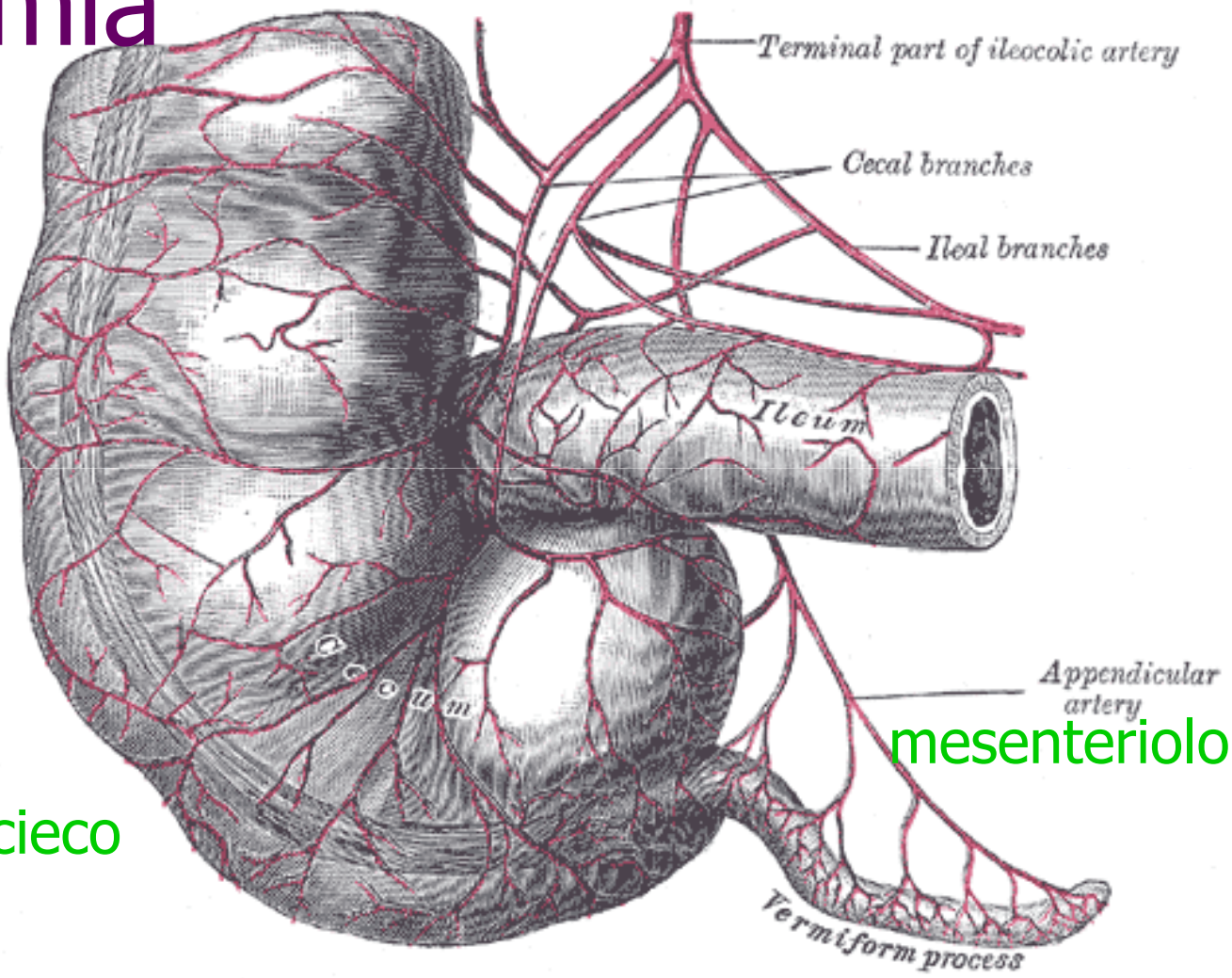



Fig 1. Age distribution of patients who underwent appendectomy.

# Anatomia

Fossa iliaca dx

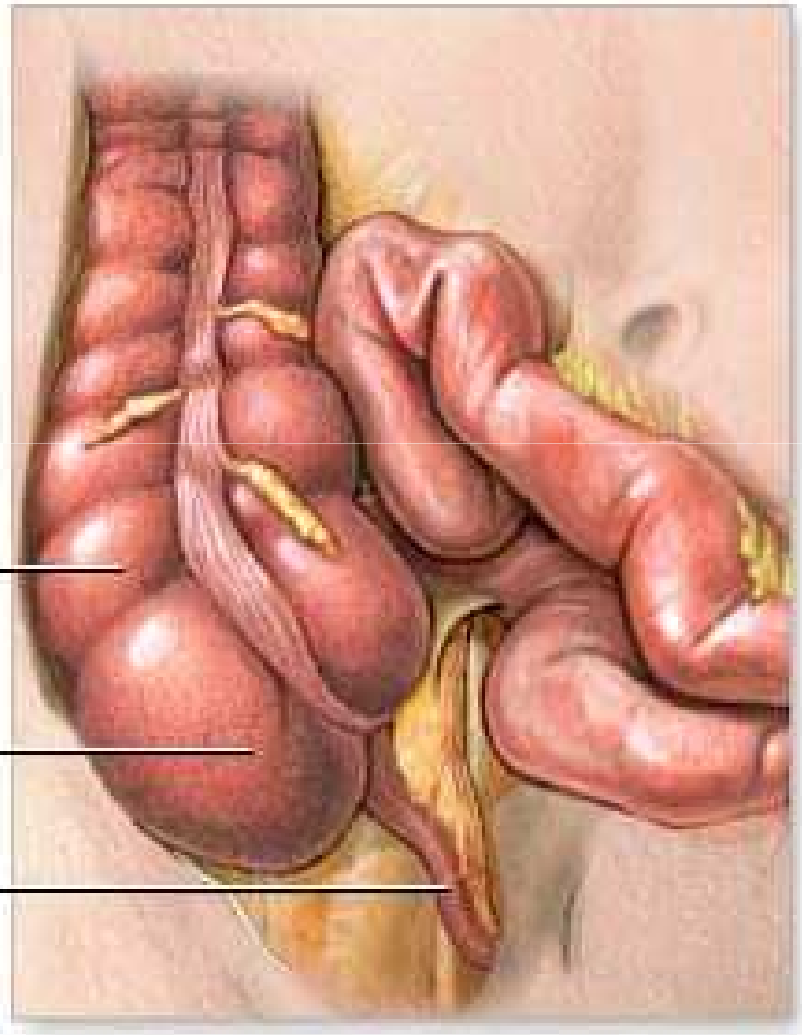



cieco

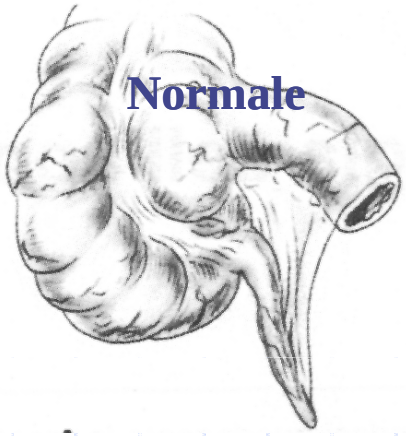
mesenteriolo

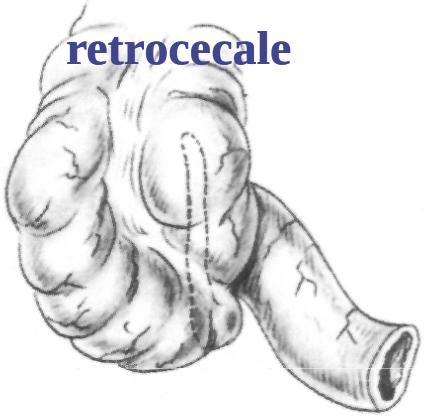
appendice

# Anatomia

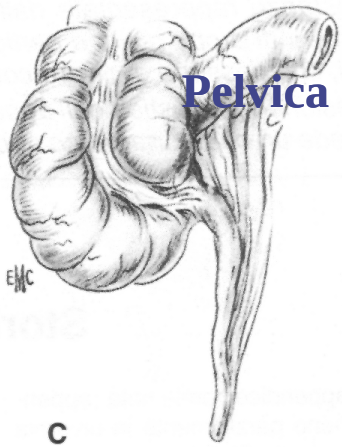


# Anatomia





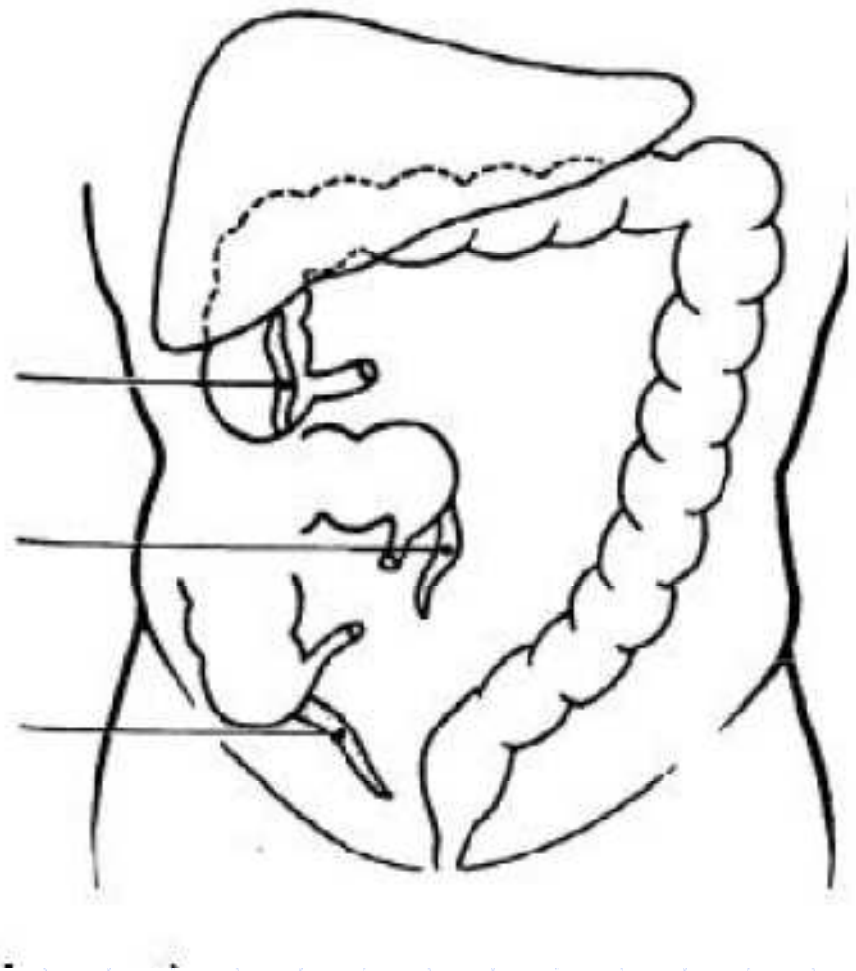




## Varianti anatomiche

# POSSIBILI SEDI DELL'APPENDICE

- Retrocecale 64%
- Pelvica 26%
- Pericolica 2%
- Sopraileale 2%
- Retroileale 6%

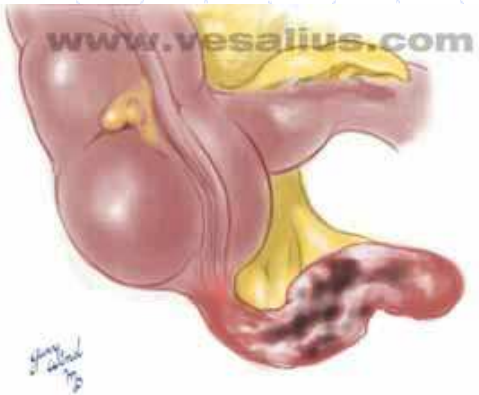


# ANATOMIA PATOLOGICA

## Appendicite acuta

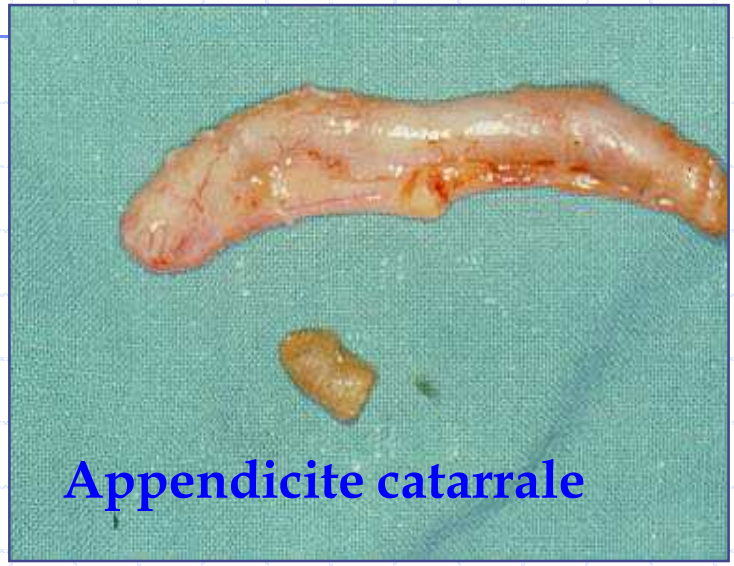

Catarrale

Flemmonosa

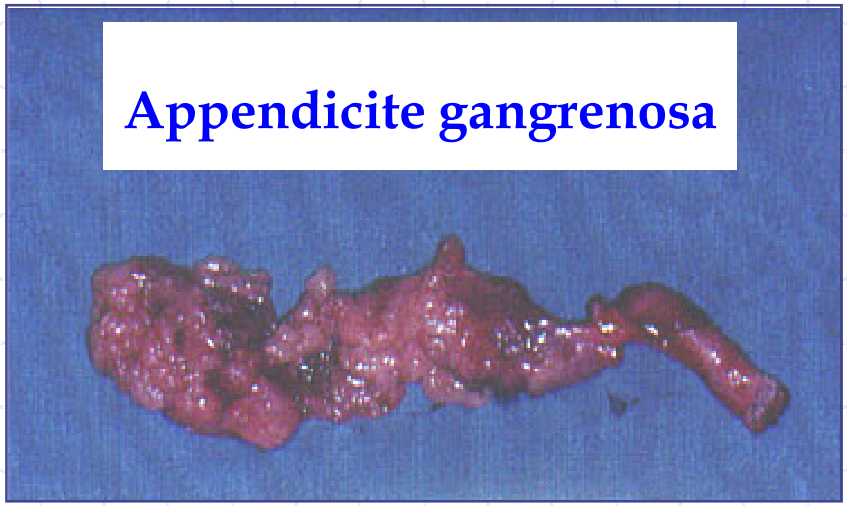



Necrotico-gangrenosa

# STADI ANATOMO - PATOLOGICI

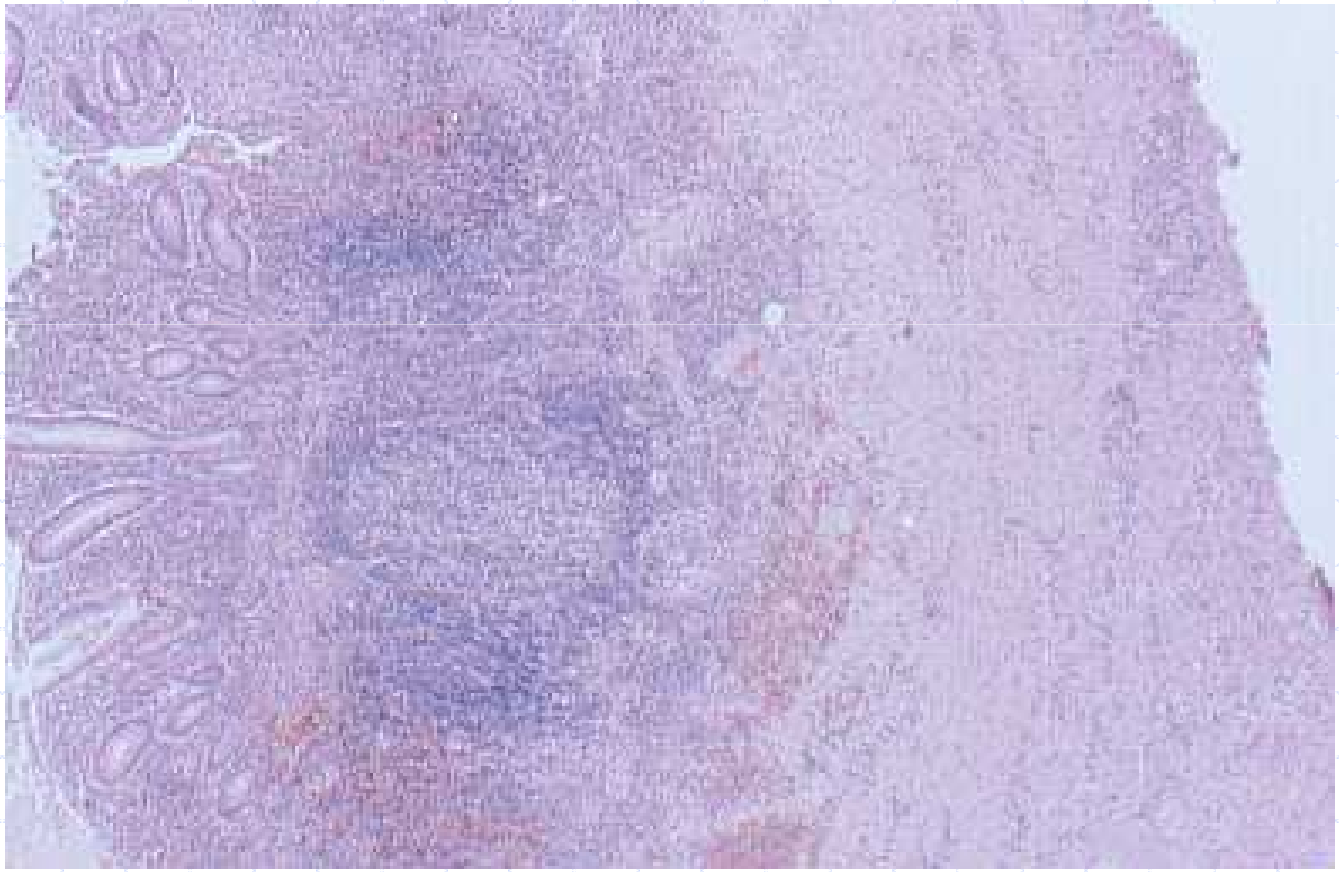






# Istologia

## Infiltrazione flogistica transmurale



# Fisiopatologia

**Fattori favorenti:**

- **Mancata fissazione parieto – colica dell'appendice**
- **Dimensioni relativamente grandi rispetto al resto dell'intestino**
- **Ostruzione del lume da parte di coproliti**

**Ostacolata circolazione a livello appendicolare**

**Virulentazione della flora batterica residente**

# FISIOPATOLOGIA

**Adulto**

Corpo estraneo
Coprolita

**Ostruzione lume appendicolare**

Iperplasia follicoli linfatici

**Bambino**

**Sviluppo batteri patogeni**

**Ostacolato drenaggio linfatico (stadio catarrale)**

**Ostruzione venosa intraparietale (stadio flemmonoso)**

**Compromissione apporto vascolare (stadio Gangrenoso)**

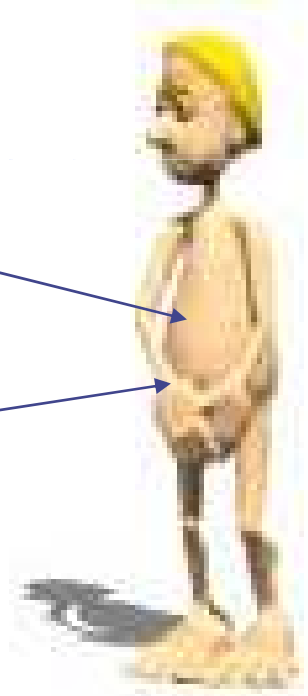
# Quadro clinico

## Dolore viscerale

Localizzazione

1)epigastrica-periombelicale

2)Fossa iliaca dx



**60-70% dei casi**

# Quadro clinico

**Alvo**

Chiusura dell'alvo
Diarroico/bambino piccolo

**Temperatrura**

Febbre 38-38,5°C

**Nausea- Vomito**

# Quadro clinico

**Infiammazione della sierosa peritoneale**
**Risentimento peritoneale**
**Esacerbazione dolore provocato**

**Contrattura difesa parete**

# QUADRO CLINICO

**Dolore addominale**

**Leucocitosi**

**Difesa muscolare**

**Esplorazione rettale +**

**Alvo chiuso**

**Vomito**

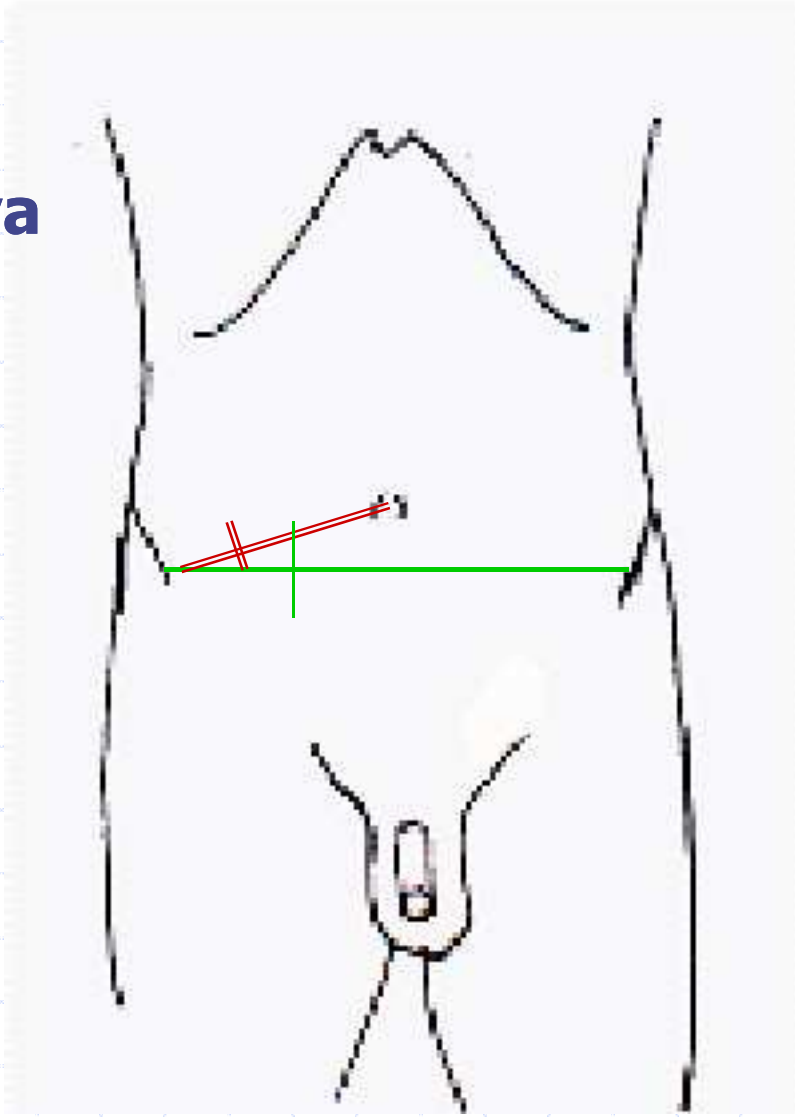
# DIAGNOSI

| ***ANAMNESI SOMMARIO*** |
| --- |
| 1. ***QUANDO SI E' PRENTATO IL DOLORE PER LA PRIMA VOLTA?***<br>*-CHIEDERE AL PZ IL PUNTO IN CUI SI E' LOCALIZZATO* |
| 2. ***QUAL'E' IL CARATTERE DEL DOLORE?***<br>*-E' DI TIPO CRAMPIFORME, CONTINUO, INTERMITTENTE?* |
| 3. ***QUAL'E' L'ORDINE DI COMPARSA DEI SINTOMI?***<br>*- E' STATO IL DOLORE IL PRIMO SINTOMO, O LA FEBBRE , LA DIARREA, IL VOMITO HANNO PRECEDUTO IL DOLORE?* |
| 4. ***QUAL'E' IL COLORE DEL VOMITO*** |
| 5. ***ALTRI IN FAMIGLIA HANNO AVUTO SINTOMI SIMILI?*** |
| 6. ***HA AVUTO IL PZ SINTOMI SIMILI PRECEDENTEMENTE?*** |
| 7. ***VI E' STATA DIARREA O SANGUE NELLE FECI?*** |

# Esame clinico

**Punti di dolorabilità elettiva**
**Punto di MC Burney**
Punto di Lanz
**Segni:**
**Rovsing**: dolore in fossa iliaca dx evocato dalla compressione in senso caudo-craniale del colon discendente

**Blumberg**:dolore di rimbalzo



# QUADRO CLINICO Peritonite

## I Periodo: dolore addominale intenso;

temperatura sui 38° - 40°;

polso piccolo – frequente;

## II Periodo: febbre elevata;

vomito alimentare;

diarrea con iniziali feci liquide poi fetide

con striature di sangue;

dolore intenso in sede iliaca destra;

# ESAMI DI LABORATORIO

- **Leucocitosi neutrofila**
- **Nel 90% dei pz il valore dei GB >15000 per mm3**
- **>PCR**
- **>VES**
- **>Fibrinogeno**

# *Esami di Laboratorio*

| Normal | Simple | Gangrenous | Perforated |
|---|---|---|---|
| 11.5 ± 6.7 | 14.9 ± 5.2 | 17.8 ± 5.2 | 18.5 ± 6.7 |

## *Valore WBC*

**Appendicitis in Children: A Ten-Year Update of Therapeutic Recommendations**

By Sherif Emil, Jean-Martin Laberge, Peter Mikhail, Livia Baican, Helene Flageole, Luong Nguyen, and Kenneth Shaw

*Montreal, Quebec*

# RX-DIRETTA ADDOME

- **Ricerca livelli idroaerei**
- **Riscontro di gas in sede appendicolare**
- **Mancata definizione del profilo dello psoas**
- **Visualizzazzione del coprolita**

# ECOGRAFIA

- Aumento di volume dell'appendice
- Aumento spessore della parete
- Aumento vascolarizzazione
- Operatore dipendente

## Clinical Versus Sonographic Evaluation of Acute Appendicitis in Children: A Comparison of Patient Characteristics and Outcomes

By Sherif Emil, Peter Mikhail, Jean-Martin Laberge, Hélène Flageole, Luong T. Nguyen, Kenneth S. Shaw, Livia Baican, and Kamal Oudjhane
*Montreal, Quebec*

# CONTRARI

***Conclusions:*** Patients undergoing sonography before appendectomy have a longer delay before operation, a higher rate of misdiagnosis, and more postoperative complications. Limiting sonography to truly equivocal cases and using it early in the diagnostic workup may improve outcomes in this group of patients.

*J Pediatr Surg 36:780-783.* 

Clinical paper

# Ultrasonography in suspected acute appendicitis in childhood—report of 1285 cases

B. Schulte [a,*], D. Beyer [a], C. Kaiser [a], S. Horsch [b], A Wiater [c]

**FAVOREVOLI**

(prevalence 9%). *Conclusion:* In children with suspected appendicitis US of the abdomen gives great diagnostical value for differential diagnosis of a.A. and other more frequent inflammatory diseases of the ileocoecal region. Thus US provides further reliable information to the referring physician. Consequently it is necessary to perform US in each child with acute abdominal pain, even if clinical diagnosis seems to be well established. 

Clinical paper

# Ultrasonography in suspected acute appendicitis in childhood—report of 1285 cases

B. Schulte [a,*], D. Beyer [a], C. Kaiser [a], S. Horsch [b], A Wiater [c]

Table 1
Sonographic findings in clinically suspected acute appendicitis

| |
|---|
| Mesenteric lymphadenitis |
| Enteritis |
| Terminal ileitis, ileocoecitis (*Yersinia enterocolitica*, *Campylobacter jejuni*) |
| Ileocolic intussusception |
| Meckel's diverticulum |
| Gastrointestinal obstruction due to postoperative adhesions |
| Duplication cyst of the intestinal wall |
| Pyelonephritis due to vesicoureteral reflux |
| Atresia of vaginal hymen |

# Score clinici

- Sono dei sistemi a punteggio che vengono generalmente utilizzati nelle "urgenze" per dare una valutazione obiettiva di un paziente con "dolori addominali"
- In letteratura ve ne sono descritti molti
- Alvarado Score

# Alvarado Scoring system

**Table 1** The Alvarado scoring system

| | Mnemonic (MANTRELS) | Value |
|---|---|---|
| Symptoms | Migration | 1 |
| | Anorexia-acetone | 1 |
| | Nausea-vomiting | 1 |
| Signs | Tenderness in RLQ | 2 |
| | Rebound pain | 1 |
| | Elevation of temperature >37.3°C | 1 |
| Laboratory | Leukocytosis | 2 |
| | Shift to the left | 1 |
| Total Score | | 10 |

Score > 6  significatività del 75 %

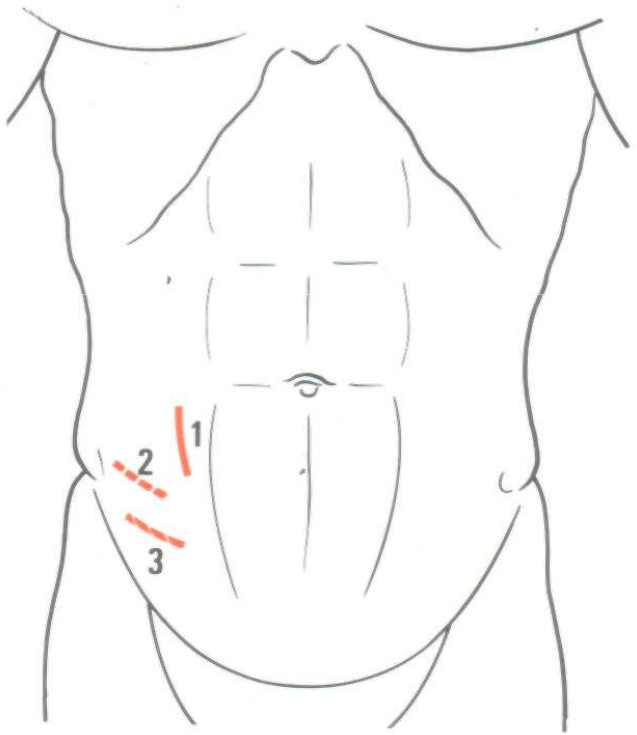
# TERAPIA

- Medica: monitoraggio del decorso clinico in ambiente ospedaliero
- Infusione endovenosa
- Antibiotici: cefalosporina+metroinidazolo

# INTERVAL APPENDECTOMY

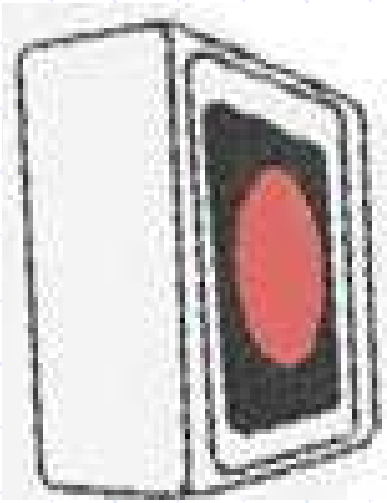
- "Raffreddare" l'episodio acuto con antibiotici
- Operare a distanza a risoluzione del quadro clinico

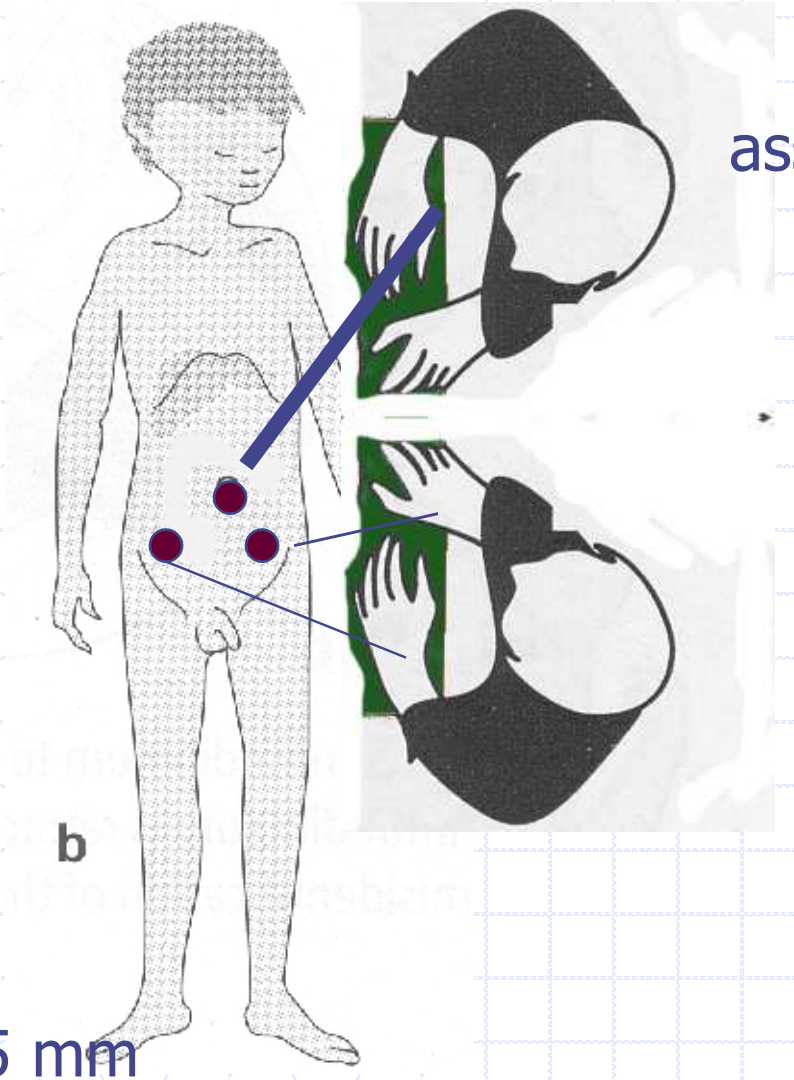
# INTERVENTO CHIRURGICO




LAPAROTOMIA

# LAPAROSCOPIA 3 trocars






3 trocar
Ombelicale 10 mm
Fossa iliaca dx e sx 5 mm

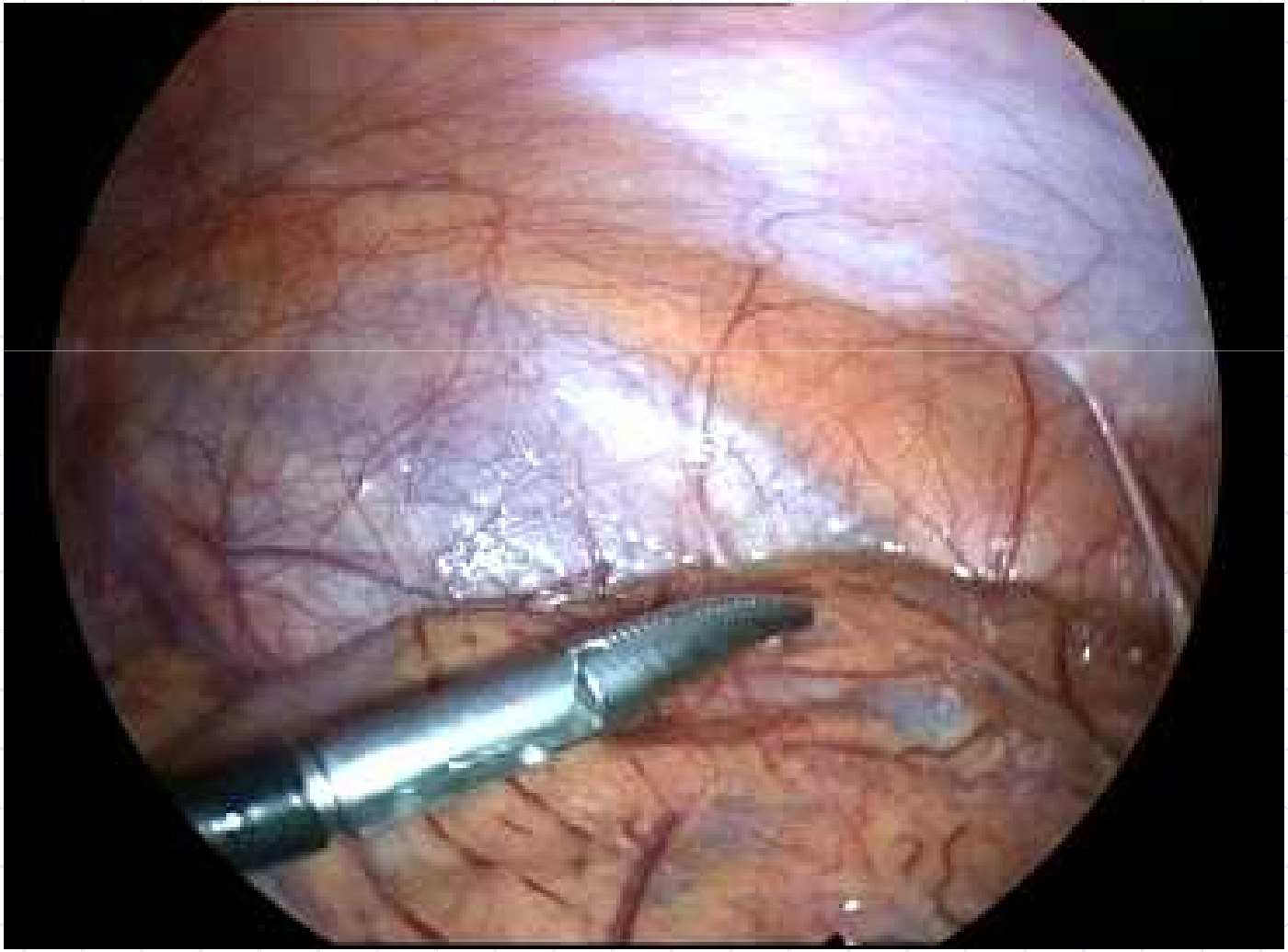
# Tecnica 3 trocars

- Localizzazione appendice
- Controllo dell'intestino tenue
- Liberazione del meso con coagulazione bipolare o monopolare e forbice
- Legatura dell'appendice con endoloop
- Sezione del moncone appendicolare
- Recupero dell'appendice

-endobag

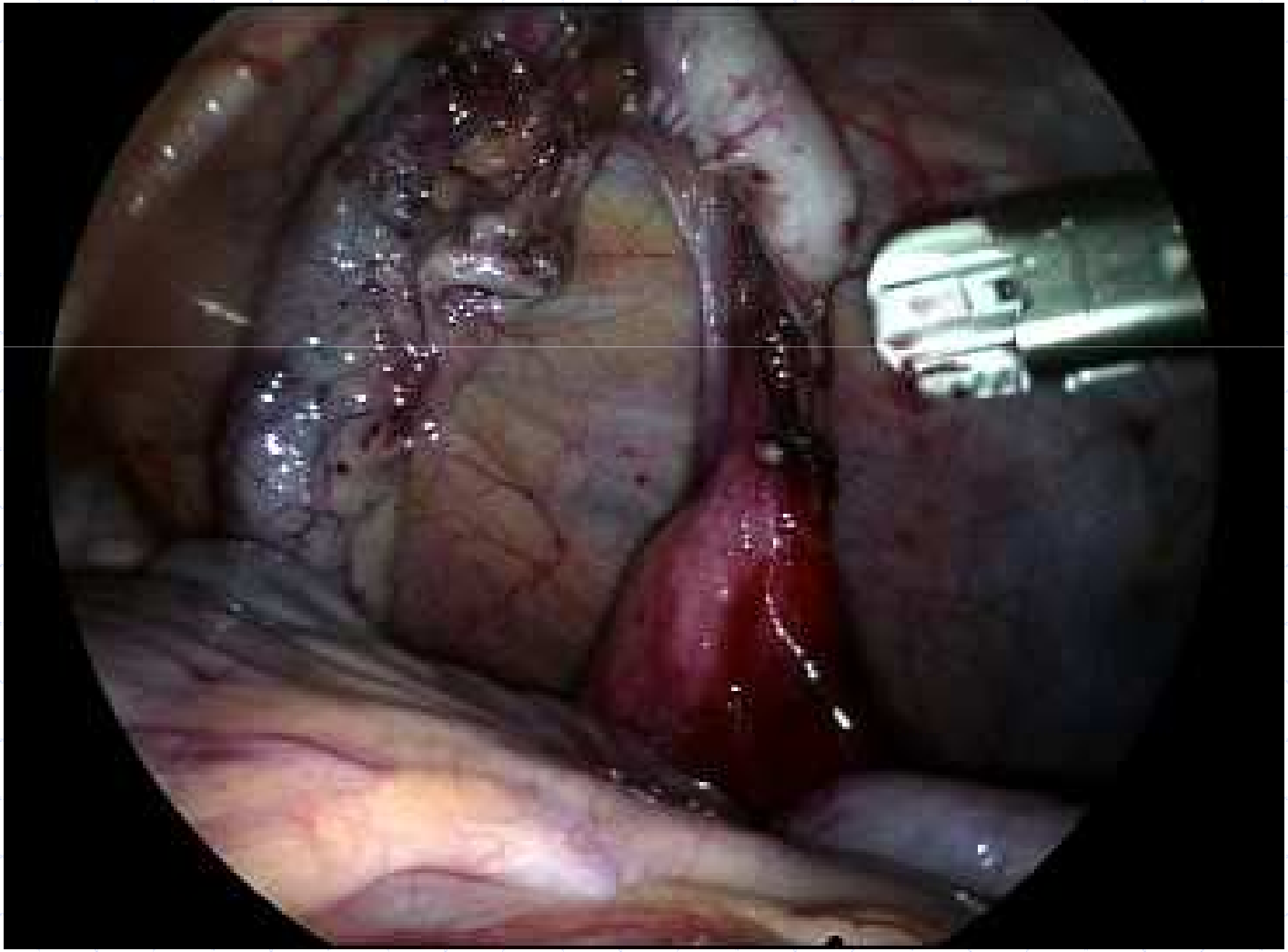
-attraverso il trocar da 10 con controllo visivo dell'appendice dal trocar sx con ottica 5mm

# LAPAROSCOPIA 3 trocars

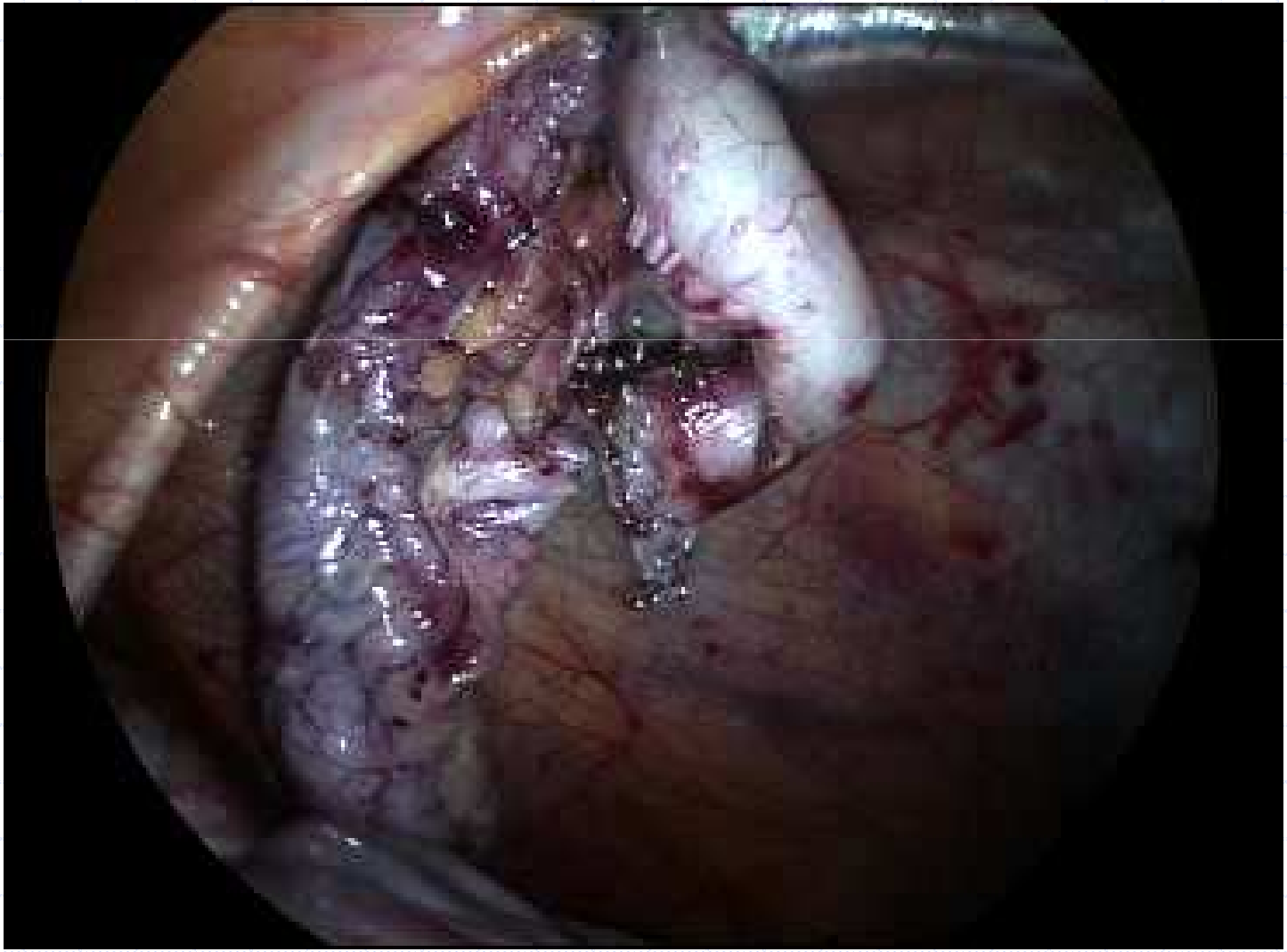


# LAPAROSCOPIA 3 trocars

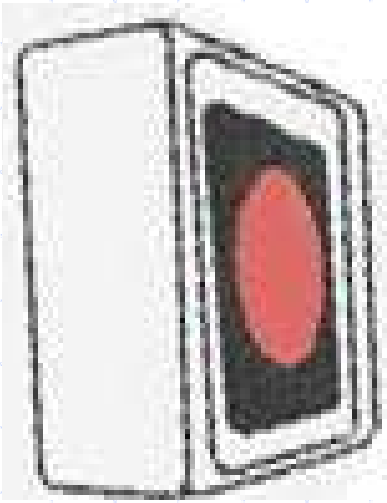
# LAPAROSCOPIA 3 trocars

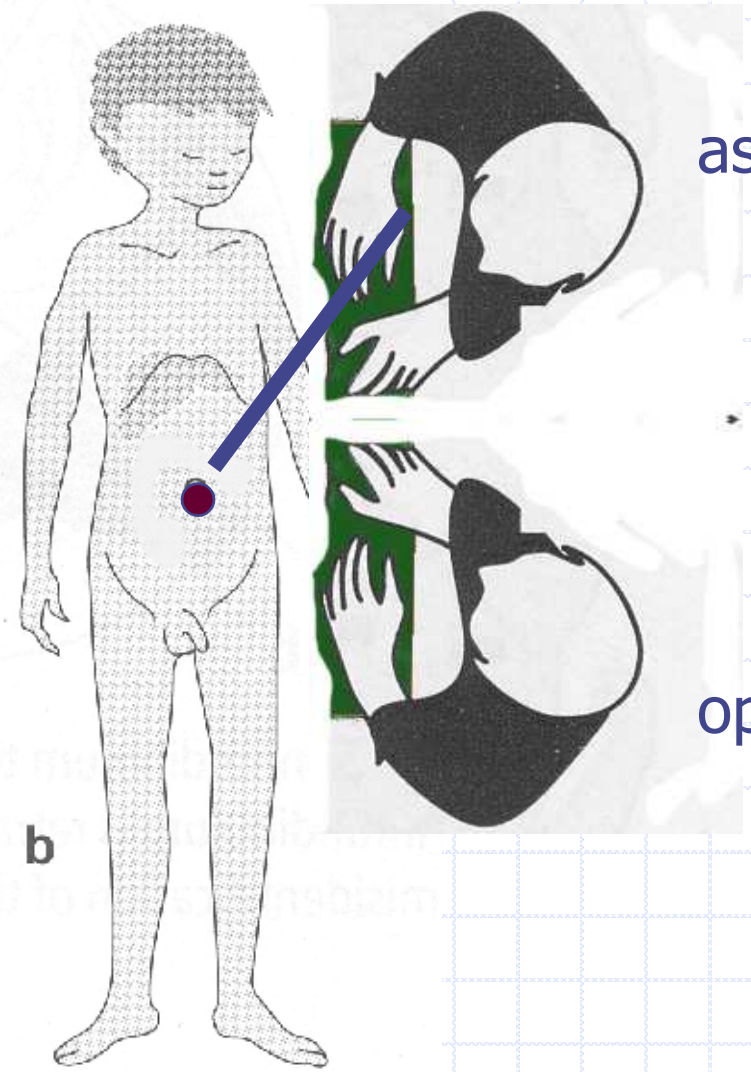


# LAPAROSCOPIA 3 trocars



# LAPAROSCOPIA 1 Trocar

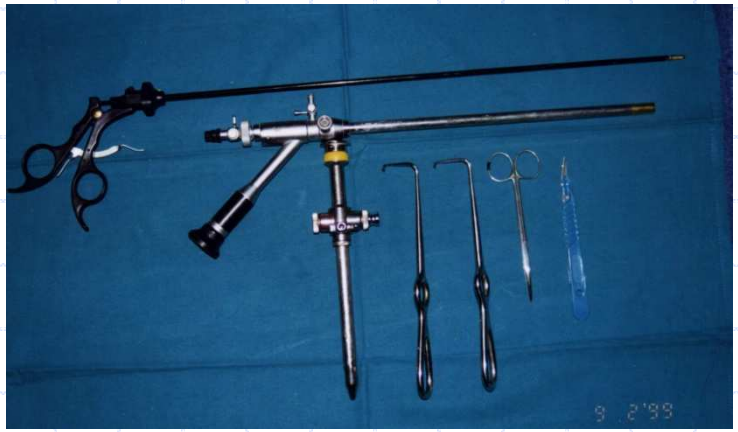


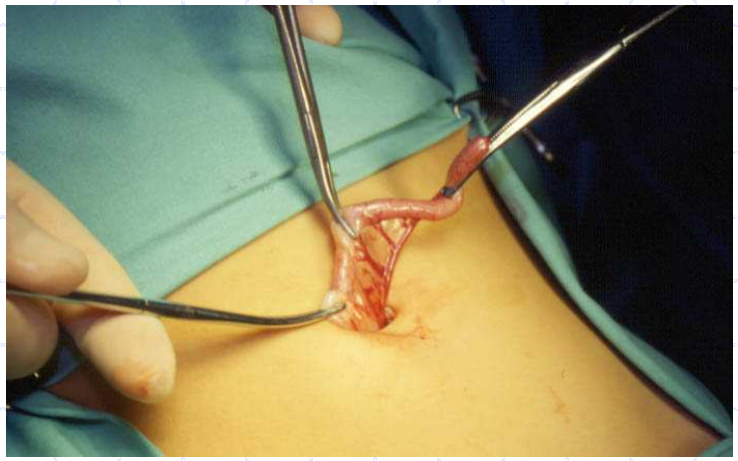


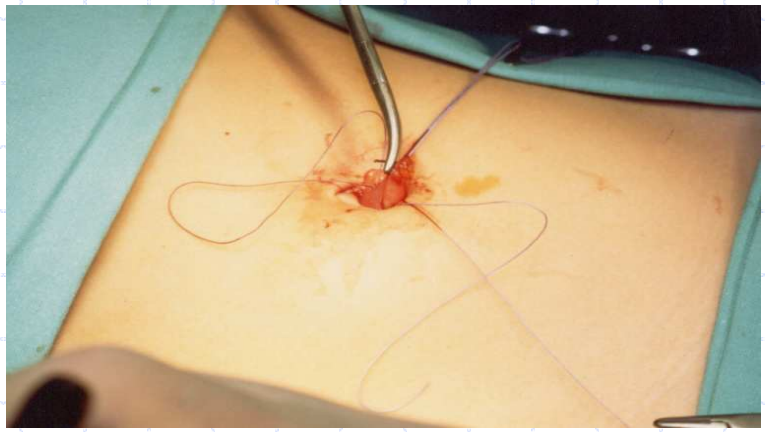

**OTA**

# Technique OUT

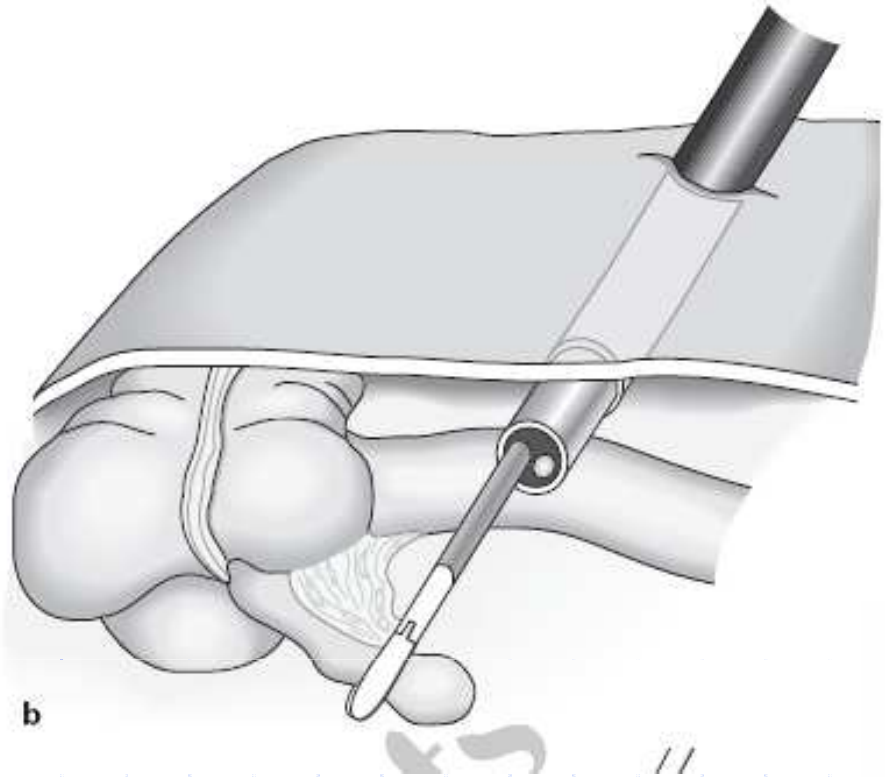
## O.T.A. One Trocar Appendectomy





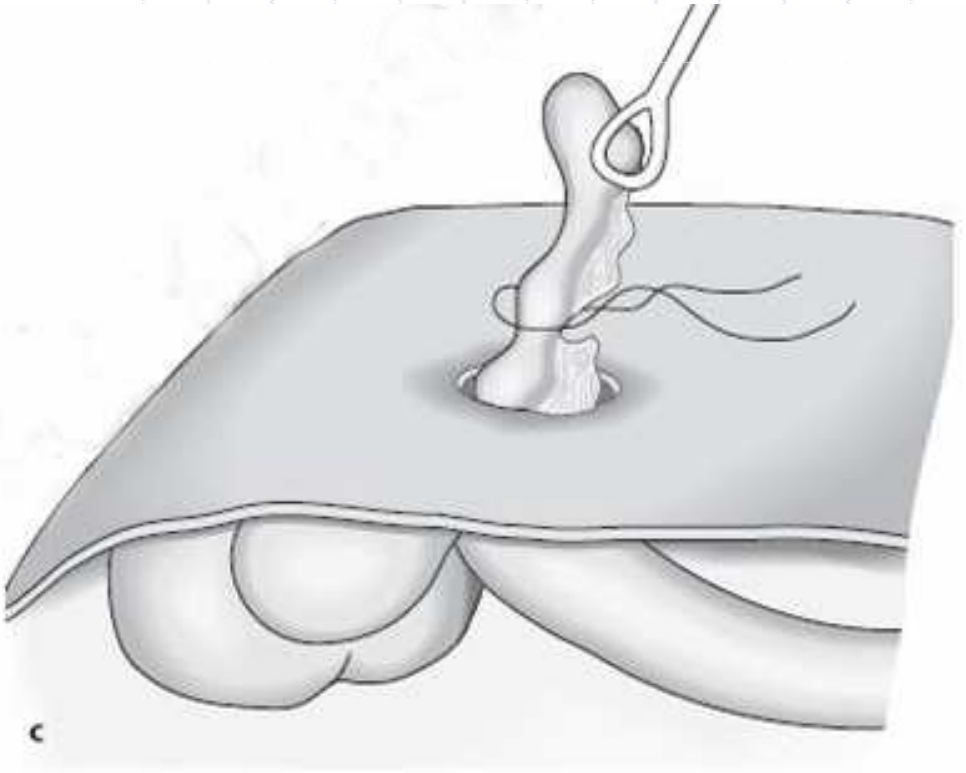


# OTA




1. Si identifica appendice,
   Si afferra

2. Si estrae dall'ombelico



# One Trocar Appendectomy

# Appendice perforata

# Appendice perforata

- Anche in caso di peritonite l'appendicectomia viene condotta con successo, dopo accurato lavaggio peritoneale viene lasciato un drenaggio nella sede del trocar dx che viene avvolto in una placca da colonstomia

# *Chirurgo Pediatra*

# *o*

# *Chirurgo Generale*

# *?????*

## Specialty Versus Generalist Care of Children With Appendicitis: An Outcome Comparison

By Frederick Alexander, David Magnuson, John DiFiore, Kathleen Jirousek, and Michelle Secic
*Cleveland, Ohio*

# *Chirurgo Pediatra = Minori complicanze*

***Conclusions:*** Children with significantly perforated appendicitis have lower complication rates and shorter lengths of hospital stay when treated by pediatric surgeons as compared with HMO adult general surgeons.

# Specialty Versus Generalist Care of Children With Appendicitis: An Outcome Comparison

By Frederick Alexander, David Magnuson, John DiFiore, Kathleen Jirousek, and Michelle Secic
*Cleveland, Ohio*

**Table 1. Summary of Complications**

| | Group A (n = 69) | Group B (n = 45) | |
|---|---|---|---|
| Nonperforated | | | |
| Wound infection | 0 | 1 | |
| Intra-abdominal abscess | 0 | 0 | |
| Small bowel obstruction | 0 | 0 | |
| Other | 0 | 0 | *P* = NS |
| | n = 27 | n = 34 | |
| Perforated | | | |
| Wound infection | 1 | 2 | |
| Intraabdominal abscess | 3 | 1 | |
| Small bowel obstruction | 4 | 0 | |
| Other | 1 | 0 | *P* = .025 |

# Laparoscopic versus Open Appendectomy in Children: A Retrospective Comparative Study of 2,332 Cases

Ciro Esposito, MD, PhD,[1] Peter Borzi, MD,[2] Jean Stephane Valla, MD,[3] Monghi Mekki, MD,[4] Abdelatif Nouri, MD,[4] Francois Becmeur, MD,[5] Hossein Allal, MD,[6] Alessandro Settimi, MD,[1] Felix Shier, MD,[7] MiguelAntonio Gonzales Sabin, MD,[8] Luciano Mastroianni, MD[9]

World Journal of Surgery

**Table 1.**
Ccmplications after laparosccpic appendectomy (LA) and open apperdectomy (OA)

| | LA (n = 124) 8.2 % | | OA (n = 65) 7.9 % | |
|---|---|---|---|---|
| | Nonperforated (n = 55) | Perforated (n = 69) | Nonperforated (n = 26) | Perforated (n = 39) |
| Urinary retention | 2 | 1 | 1 | 0 |
| Pneumonia | 2 | 1 | 2 | 1 |
| Drug allergy | 1 | 0 | 1 | 1 |
| Seroma | 0 | 0 | 2 | 3 |
| Umbilical granuloma | 7 | 15 | 0 | 0 |
| Intrabdominal abscesses | 0 | 3 | 2 | 6 |
| Umbilical infection | 18 | 20 | 0 | 0 |
| Wound infections | 2 | 0 | 2 | 5 |
| Small bowel obstructions | 0 | 0 | 0 | 3[a] |
| Bleeding of the meso | 7 | 11 | 2 | 4 |
| Bowel lacerations | 0 | 1 | 1 | 0 |
| Postoperative fever | 2 | 5 | 1 | 4 |
| Appendix fragmentation | 0 | 3 | 0 | 2 |
| Parietal bleeding | 1 | 2 | 1 | 1 |
| Postoperative pain | 2 | 2 | 9 | 7 |
| Other | 11 | 5 | 2 | 2 |

[a]These 3 patients require a redo surgery to perform an adhesiolysis.

# Laparoscopic versus Open Appendectomy in Children: A Retrospective Comparative Study of 2,332 Cases

Ciro Esposito, MD, PhD,[1] Peter Borzi, MD,[2] Jean Stephane Valla, MD,[3] Monghi Mekki, MD,[4] Abdelatif Nouri, MD,[4] Francois Becmeur, MD,[5] Hossein Allal, MD,[6] Alessandro Settimi, MD,[1] Felix Shier, MD,[7] MiguelAntonio Gonzales Sabin, MD,[8] Luciano Mastroianni, MD[9]

World Journal of Surgery

**Table 2.**
Comparison of the main features of the 2 groups

| Aspects analysed | Laparoscopy | Open |
|---|---|---|
| Number of patients | 1,506 | 826 |
| Gender | B966/G540 | B648/G178 |
| Median age | 9.4 | 8.9 |
| Technique/incision | IN 921 (61.1%). OUT 571 (37.9%). MIXED (1%) | McBurney 795 (96.4%) |
| State of the appendix | N 170 (11.3%). NP 917 (60.9%). P 183 (12.1%). Perit 236 (15.7%) | N 36 (4.3%). NP 641 (72.6%). P 79 (9.6%). Perit 70 (8.5%). |
| Retrocecal appendix | 281 (17.6%) | 77 (9.3%) |
| Treatment of other pathologies | 33 (2.2%) | 8 (0.9%) |
| Purse-string suture on the caecum | 184 (12.2%) | 257 (31.1%) |
| Median duration of surgery | 40 minutes | 45 minutes |
| Drainage | 65 (4.3%) | 49 (5.9%) |
| Conversion | 25 (1.6%) | 0 |
| Complications | 124 (8.23%) | 65 (7.9%) |
| Median hospital stay | App 3 days, Perit 5.2 days | App 4.3 days, Perit 8.3 days |

B: boy; G: girl; N: normal; NP: nonperforated; P: perforated; Perit: peritonitis; App: appendicitis.

# Appendice è utile