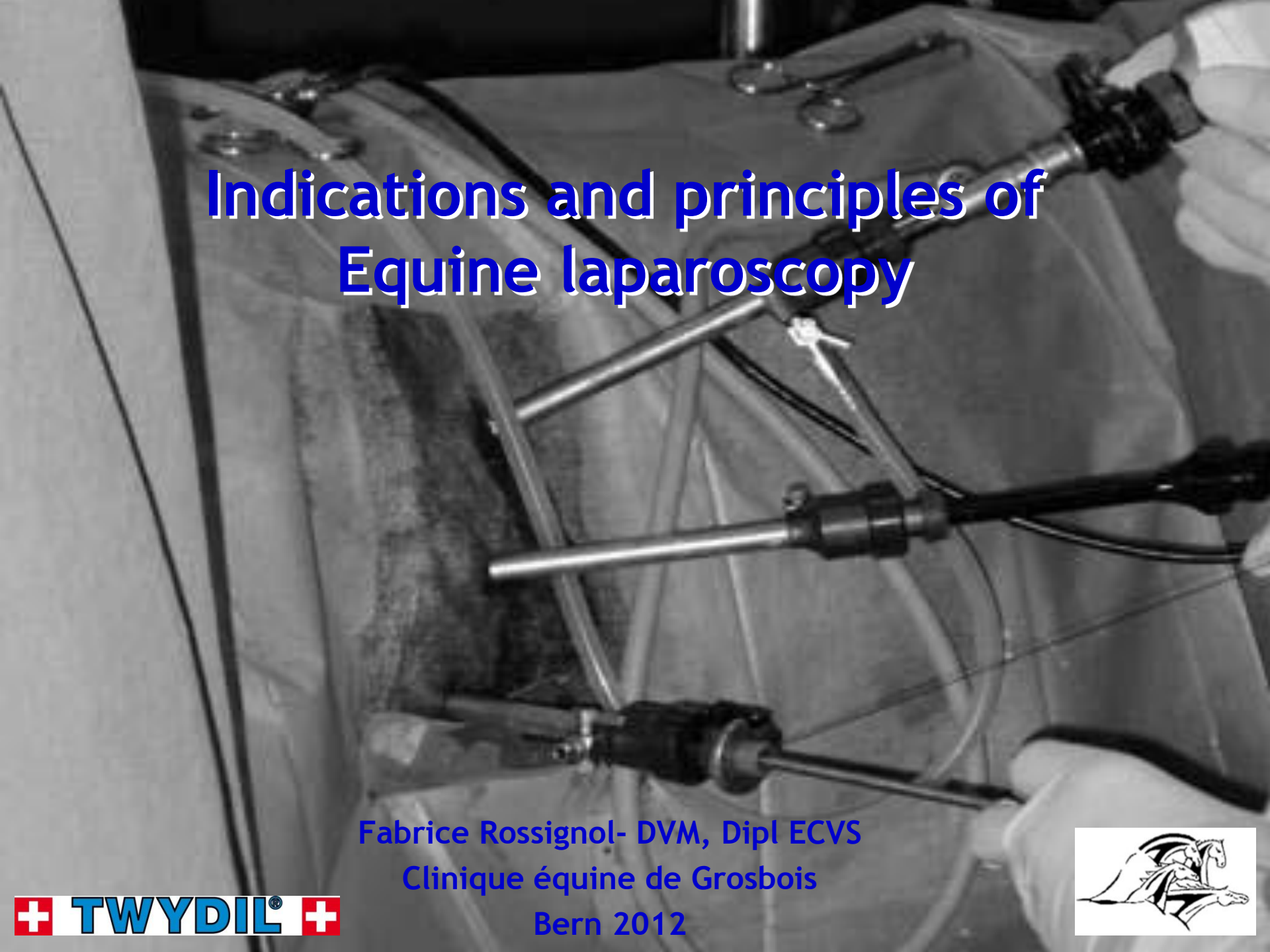


Indications and principles of Equine laparoscopy

Fabrice Rossignol- DVM, Dipl ECVS
Clinique équine de Grosbois
Bern 2012

Laparoscopy

- Widely used in human surgery
- Many increasing applications in horses
- « The eye is into the body»
- BUT: same principles as in open general surgery: dissection, hemostasis, retractors… and Halsted principles
- Surgeon familiar with soft tissue surgery
- Surgical mistake may lead to fatal consequences

Diagnostic/ surgical laparoscopy

Standing horse

- Diagnosis (dorsal + pelvic part of the abdomen)
- Biopsy /adhesiolysis/ embryotranfer
- Ovariectomy
- Cryptorchectomy/ castration
- Hernioplasty
- Nephrosplenic space closure
- Néphrectomy
- Uteropexy
- Learning (rectal palpation)

Recumbent horse

- **Diagnosis (ventral + pelvic part of the abdomen)**
- **Cryprorchectomy**
- **Hernioplasty**
- **Bladder surgery (stone + rupture)**
- **Reparation of ventral hernia**
- **Colopexy**
- **Adhesiolysis**

SOMMAIRE

Diagnostic laparocopy

Indications

- Recurent colics
- Chronic weight loss
- Abnormal rectal palpation (mass)
- Peritonitis /suspicion of adhesions
- pyelonephritis
- Evaluation of rectal laceration
- Suspicion of bowel rupture
- Intraabdominal hemmorhage
- Abnormal abdominal ulrasonography

Contre-indications

- Violent horse, gaz distension, diaphragmatic hernia

Biopsy technique

Laparoscopic biopsy allows a direct visulalisation of the organ

Advantages of laparoscopy vs ultrasonography:

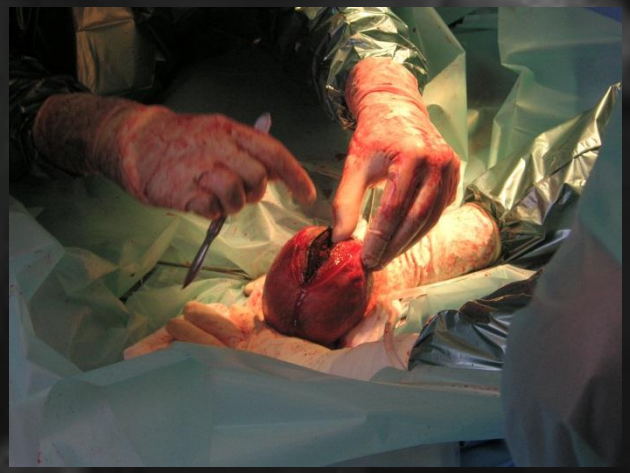
- Possible in deep organs
- Prevent any risk to sample another organ
- Precise choice of biopsy site
- Full visualization of the area (metastasis, adhesions…)
- Check for hemorrhage (kidney)

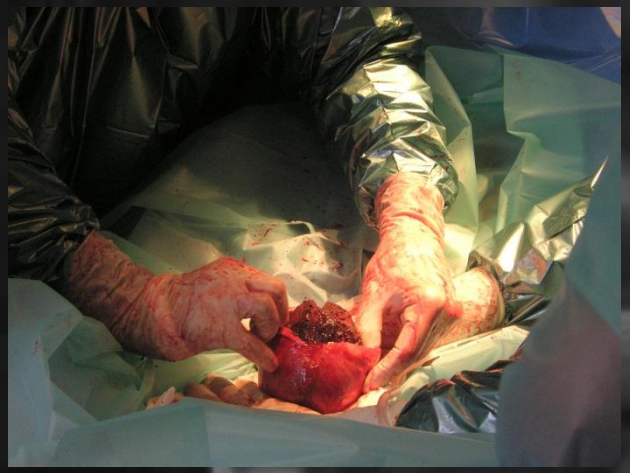
Biopsy technique

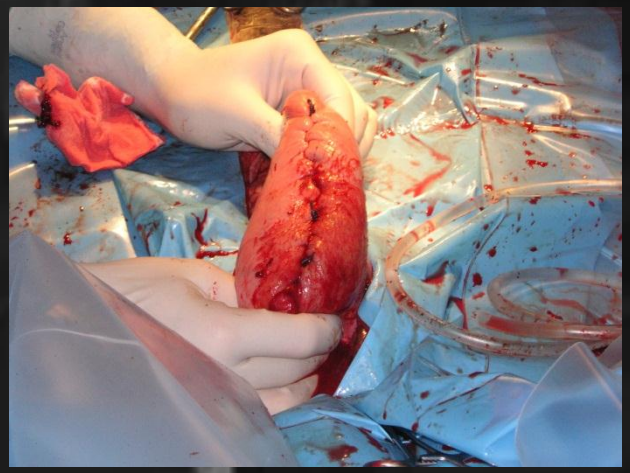
- Standing vs recumbent technique (both possible)
- Better to look for something (rectal palpation, ultrasonography, xylose absorption test…)

Ex: Uterine mass

Ex: Uterine mass

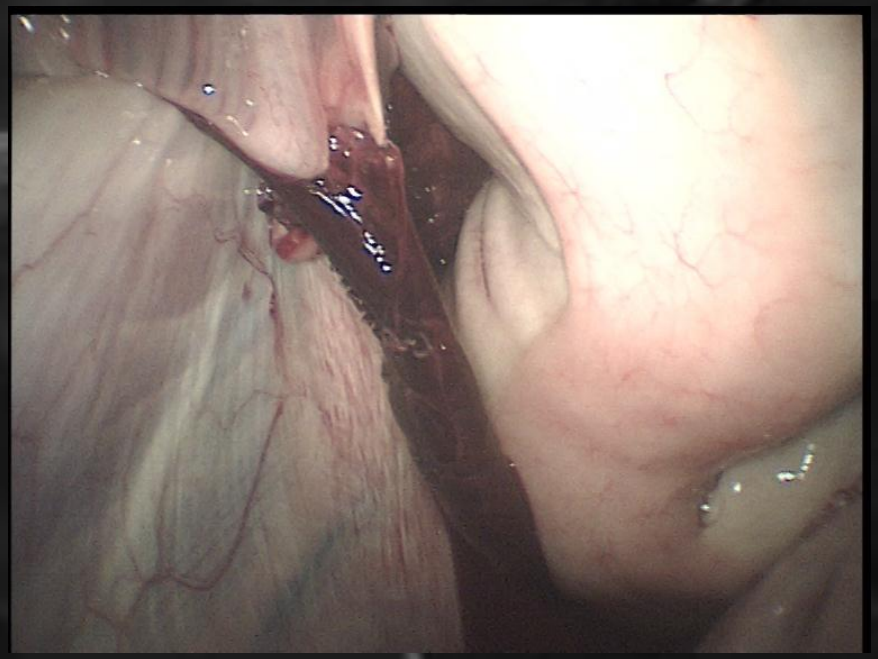


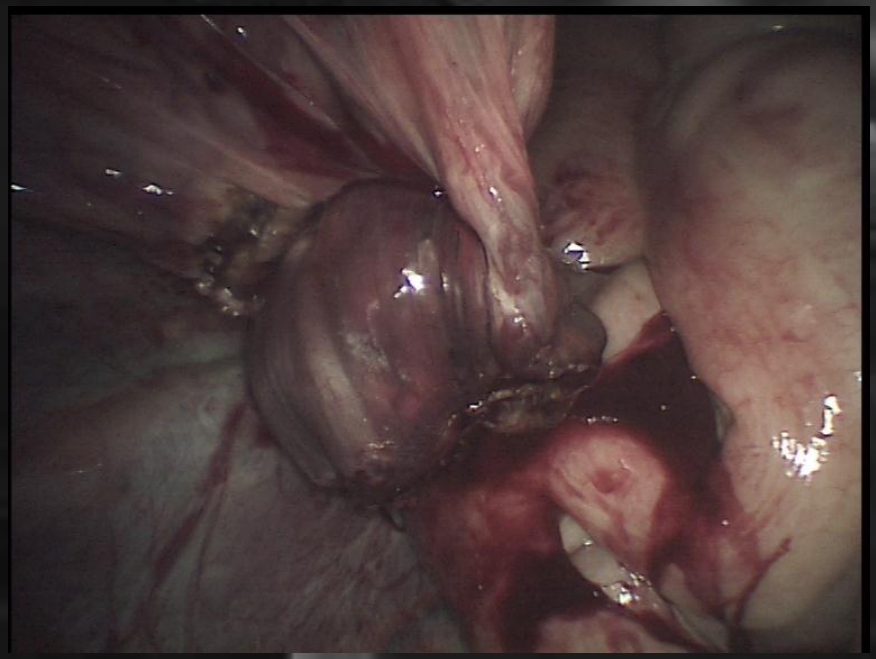




TWYDIL®

Ex: Post castration hemmorhage





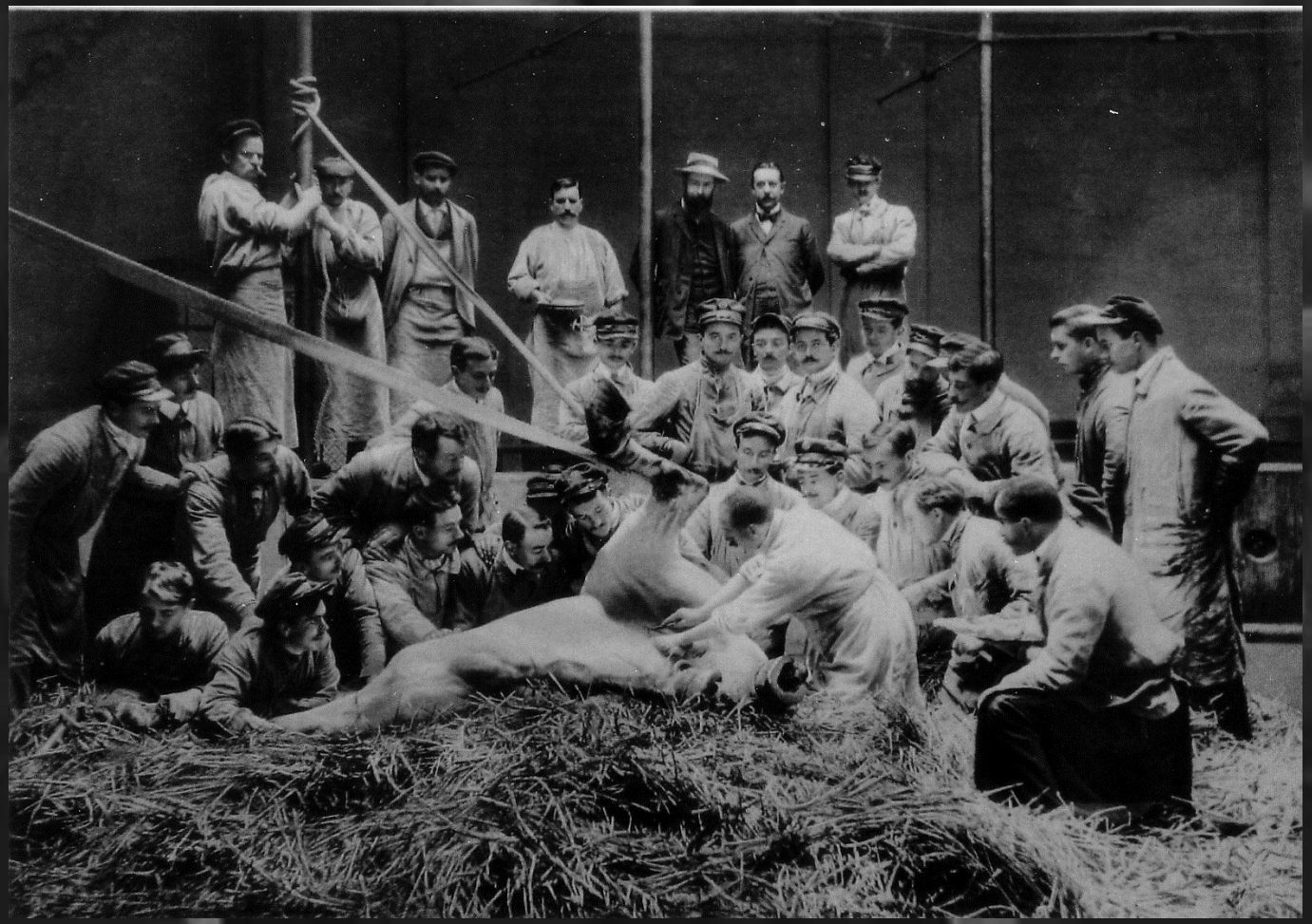
TWYDIL®

Laparoscopy of the male inguinal area

- Many surgeries involving testis
- Various techniques, modifications along time, …
- Abdominal cryptorchid, hernioplasty, castration on normal descended testis, management of complications following standard castration

TWYDIL®

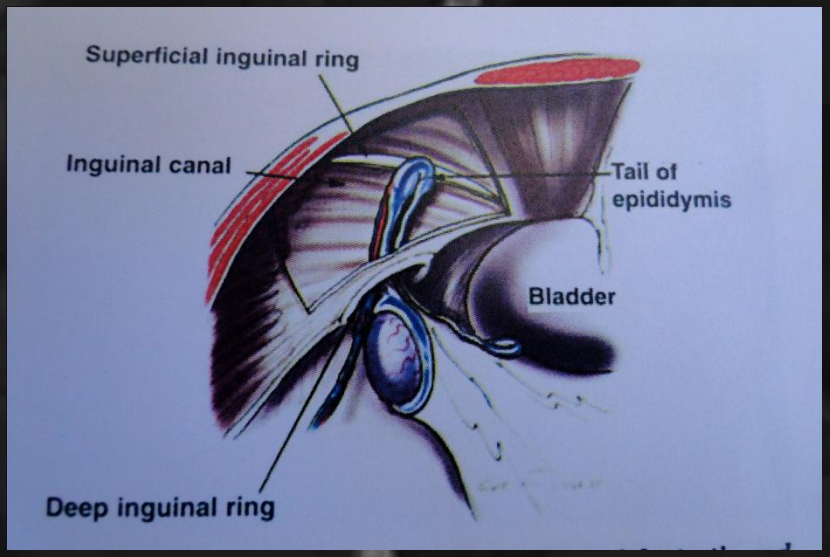
Laparoscopic castration

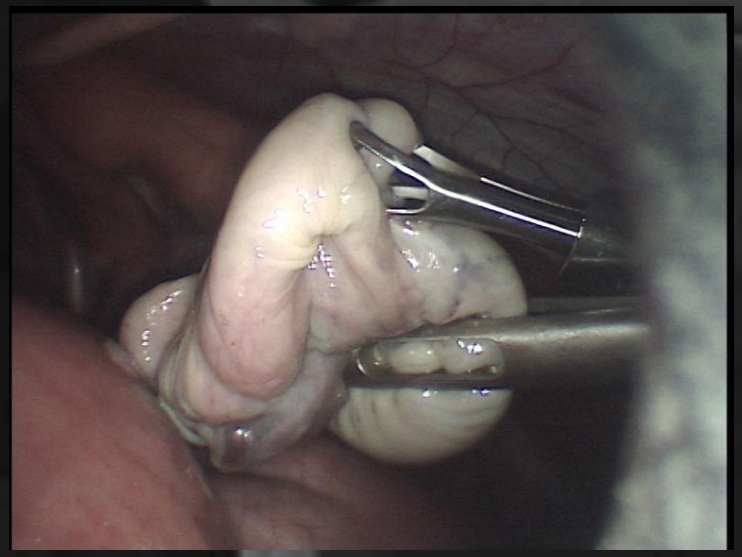


TWYDIL®

Abdominal cryptorchid

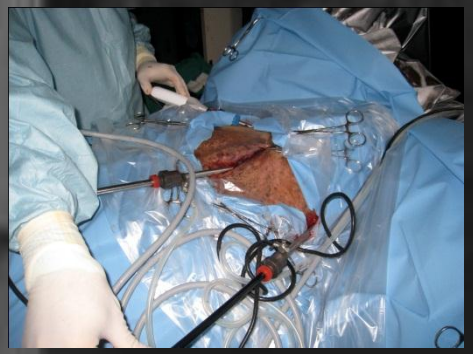
- Abnormal position of one or both testis
- Complete abdominal cryptorchid vs incomplete abdominal cryptorchid vs inguinal cryptorchid





Abdominal cryptorchid

- Gold standard
- Standing vs recumbent
- Suture vs electrocautery vs ligasure
- Testis removed or left in place
- Castration of the opposite testis



TWYDIL®

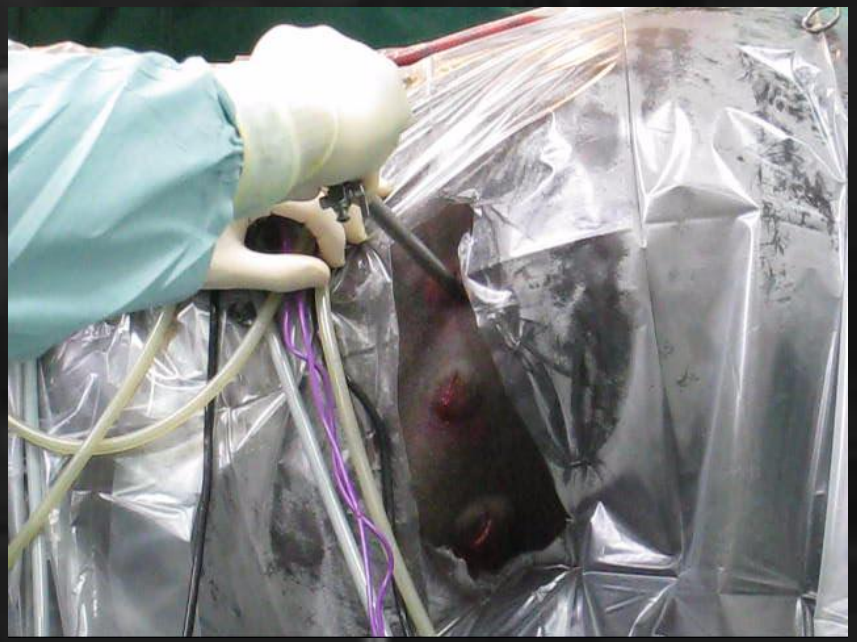
Abdominal cryptorchid: laparoscopic technique

- trans-inguinal +/- para-inguinal ultrasonography: testis location and most important for us exclusion of inguinal positioning => choice of the technique (transabdominal technique described)
- Standing technique + testicule ligated + removed or left in place: preferred
- Racing thoroughbreds: GA in Trendelenburg position if bilateral castration with one descended testis (doping)
- 71 cases (2004-2011)

Abdominal cryptorchid: standing technique

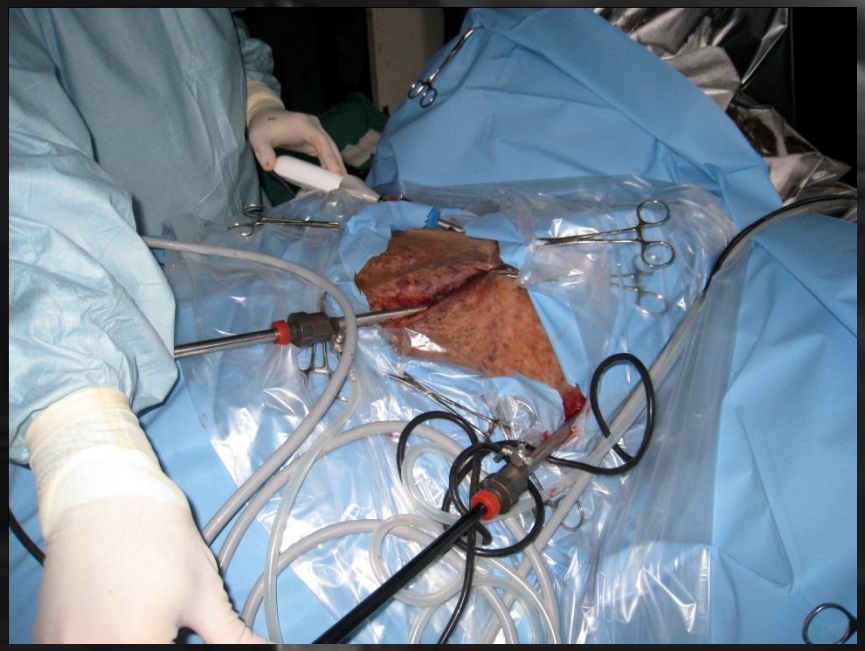
- Testicle found following the deferent duct crossing the lateral ligament of the bladder
- Local block on the spermatic cord proximal to the ligatures using 10 to 20ml of 2% lidocaïne (dilution if pony)
- Testicle placed horizontal
- Double ligated using extracorporeal Roeder knot or modified Roeder knot
- Left in placed or removed through a minimal low flank incision
- Contra-lateral descended testis may be castrated standing laparoscopically or on GA by an inguinal approach

Abdominal cryptorchid: standing technique



TWYDIL®

Abdominal cryptorchid: recumbent technique



Abdominal cryptorchid: recumbent technique

- Dorsal recumbency + positive pressure
- Insufflation using verres needle 1 cm caudal to umbilicus until 10 to 12 mmHg
- Trocart / cannula for laparoscope midline same position as verres needle
- Instruments trocart-cannula introduced laterally under visual control
- Testicle grasped using Babcock through contra-lateral portal
- Extraction and castration or extracorporeal knots or Ligasure through ipsi lateral portal
- Testicle can be removed from a stab incision through the Linea alba after switching the intruments
- X stiche on the Linea alba + skin sutures

Abdominal cryptorchid: recumbent technique

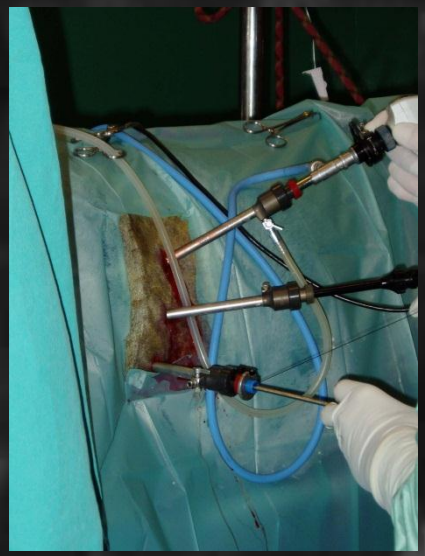
TWYDIL®

Abdominal cryptorchid: recumbent technique

TWYDIL®

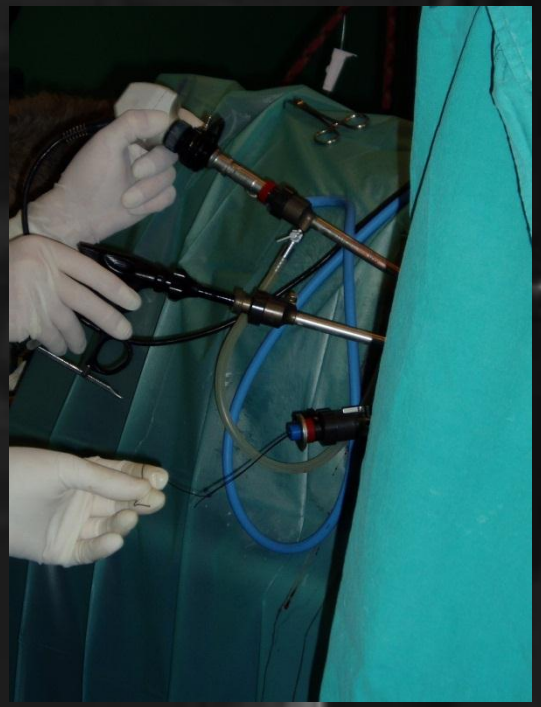
Laparoscopic castration of stallion with descended testis

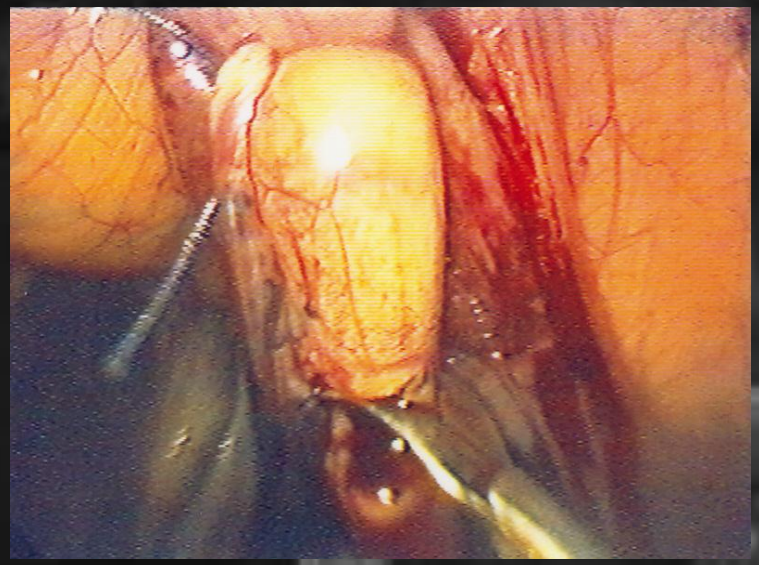
- Laparoscopic technique: adapted from Utrecht (Rijkenhuisen 2002)
- Principle:
  - Standing
  - Hemostasis and section of spermatic cord
  - Testicules left in position
  - Testicular involution within 5 months



Laparoscopic castration of stallion with descended testis

- Technique
  - Extracorporeal knots
  - Ligasure





TWYDIL®

Laparoscopic castration of stallion with descended testis

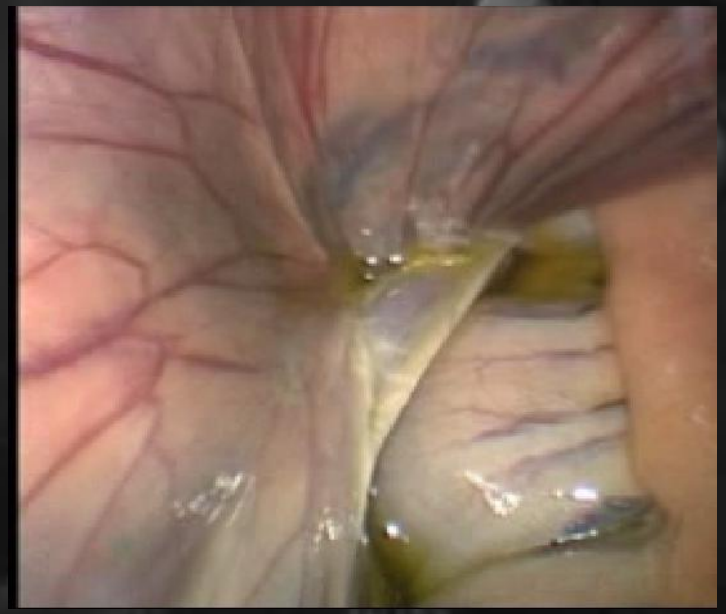
Results

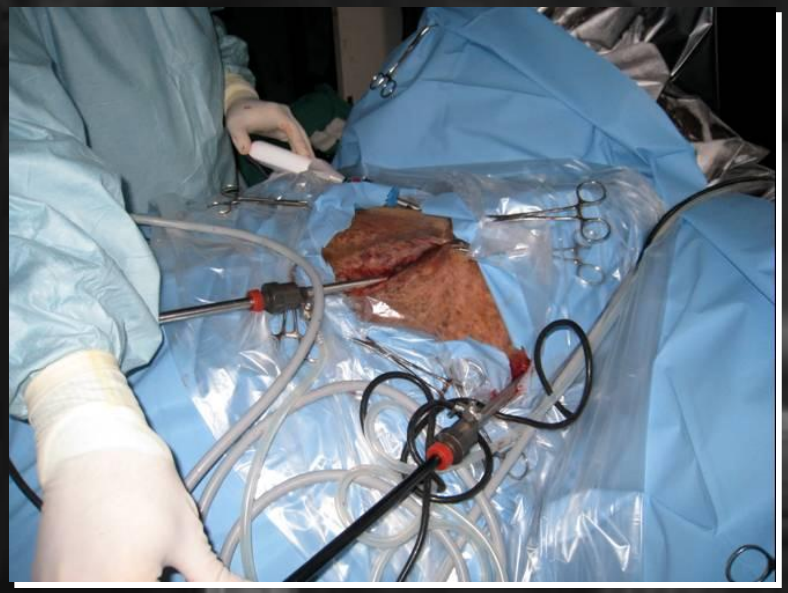
121 horses operated between january 2005 to october 2010

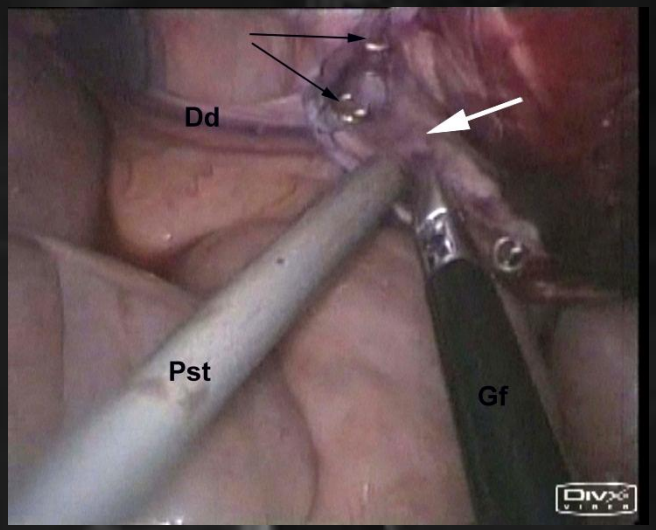
- Extracorporeal knots: n = 40, Ligasure: n = 81
- 1 horse: persistant male behaviour despite of normal testosterone level: recastrated using inguinal approach
- 1 horse: adhesion between bladder and deferent duct 5 months post op
- No significant difference with the inguinal technique used in our clinic for complications and surgical time
- High owner's satisfaction rate (98%)
- But still risk of revascularisation (4%)

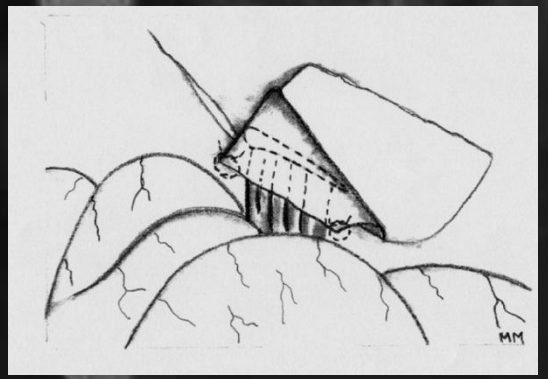
TWYDIL®

Inguinal hernioplasty





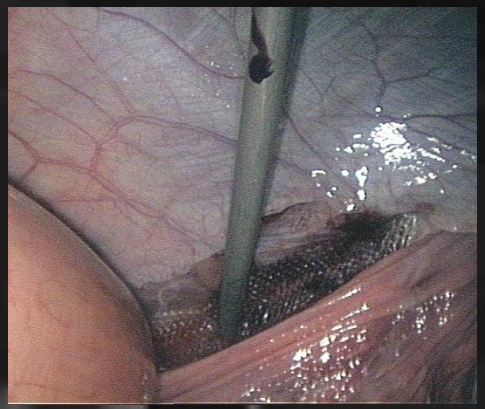


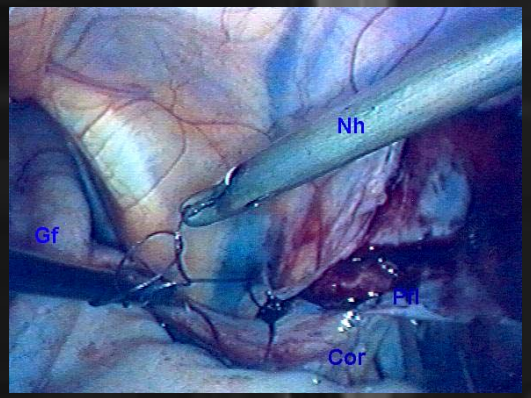


TWYDIL®

Inguinal hernioplasty

- **Laparoscopic testis sparing hernioplasty** => Indicated in stallions with a history of inguinal hernia in order to prevent recurences
- Standing vs recumbent
- Unilateral or bilateral
- Four techniques
  - Retropetitoneal mesh (Fischer et al 1995)
  - Rolled mess implantation (Mariën 2002)
  - Peritoneal flap hernioplasty (Rossignol -Boening 2005, Wilderjans 2012)
  - Glueing technique (Rossignol-Boening 2012)
- Direct suturing if castration (geldings and foals)



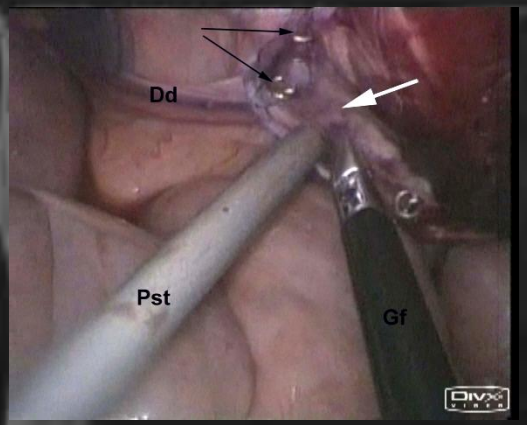


Indications

- Stallions with a history of inguinal hernia
- Prevention of recurrences when castration is not an option
- Bilaterally when both testis are present or unilaterally on the contra-lateral side
- Made few days after manual reduction or reduction via an inguinal approachif standing technique
- Better to wait 6 weeks after laparotomy if recumbent technique

Laparoscopic Peritoneal flap hernioplasty in recumbent horses

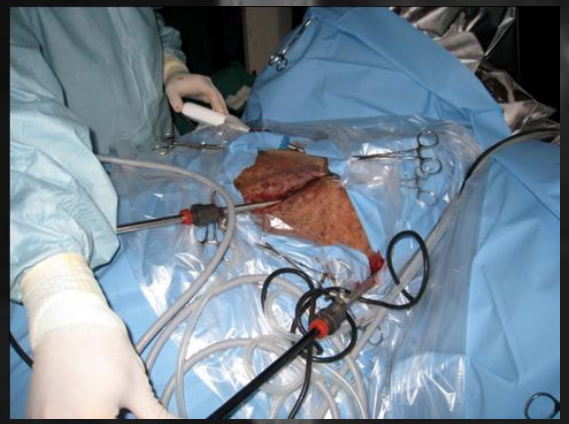
Laparoscopic Hernioplasty in Recumbent Horses Using Transposition of a Peritoneal Flap. F. Rossignol, R. Perrin, and K.J Boening
Vet surg 2005



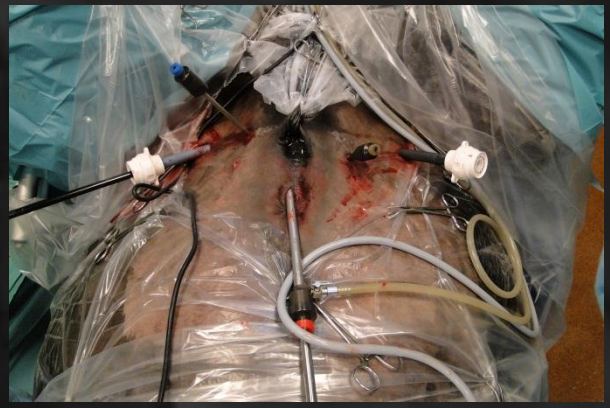
TWYDIL®

Anesthesia, positioning and surgical preparation

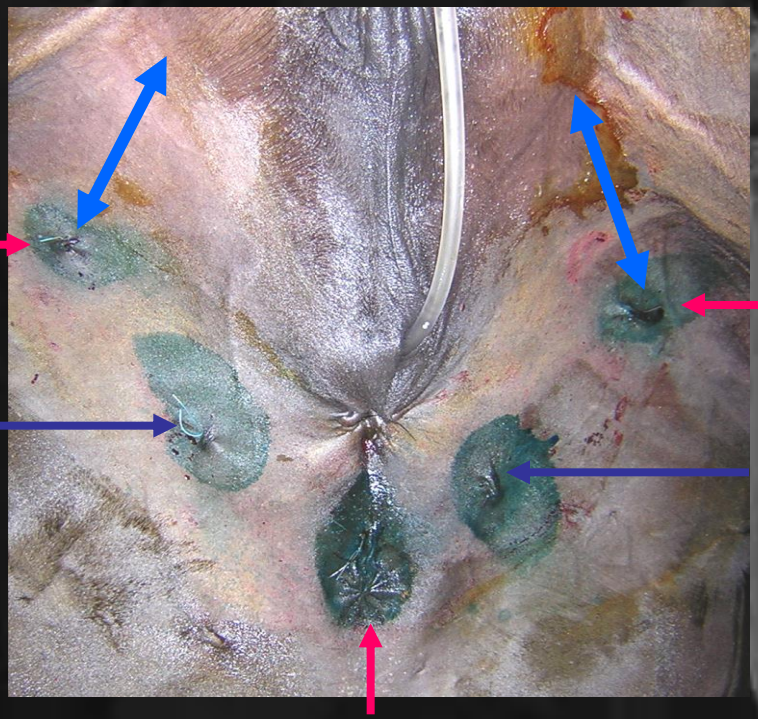
- Hay and straw withheld for 36 hours, and pellets for 24 hours before surgery
- ATB + NSAIDs preop
- Intermittent positive pressure ventilation
- Urinary catheter
- Laparoscopy tower is placed caudal to the horse



Surgical technique

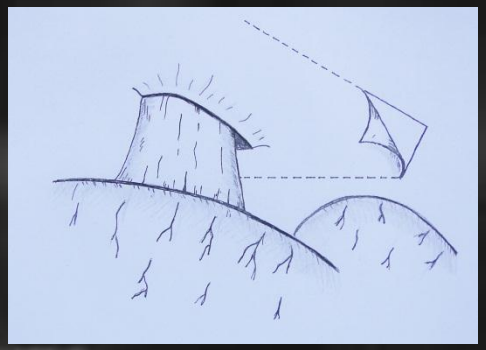


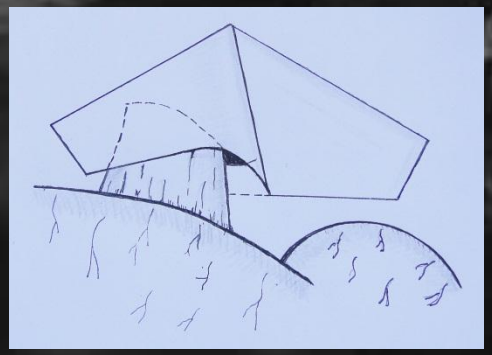
12 cm cranio laterally to the external inguinal rings

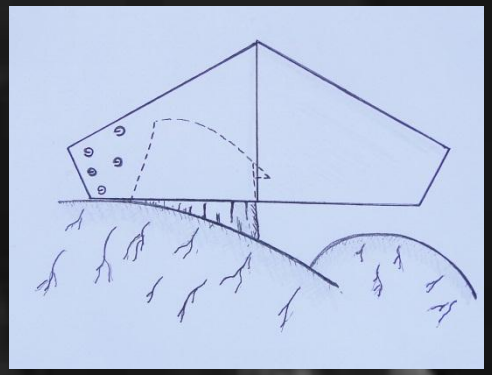


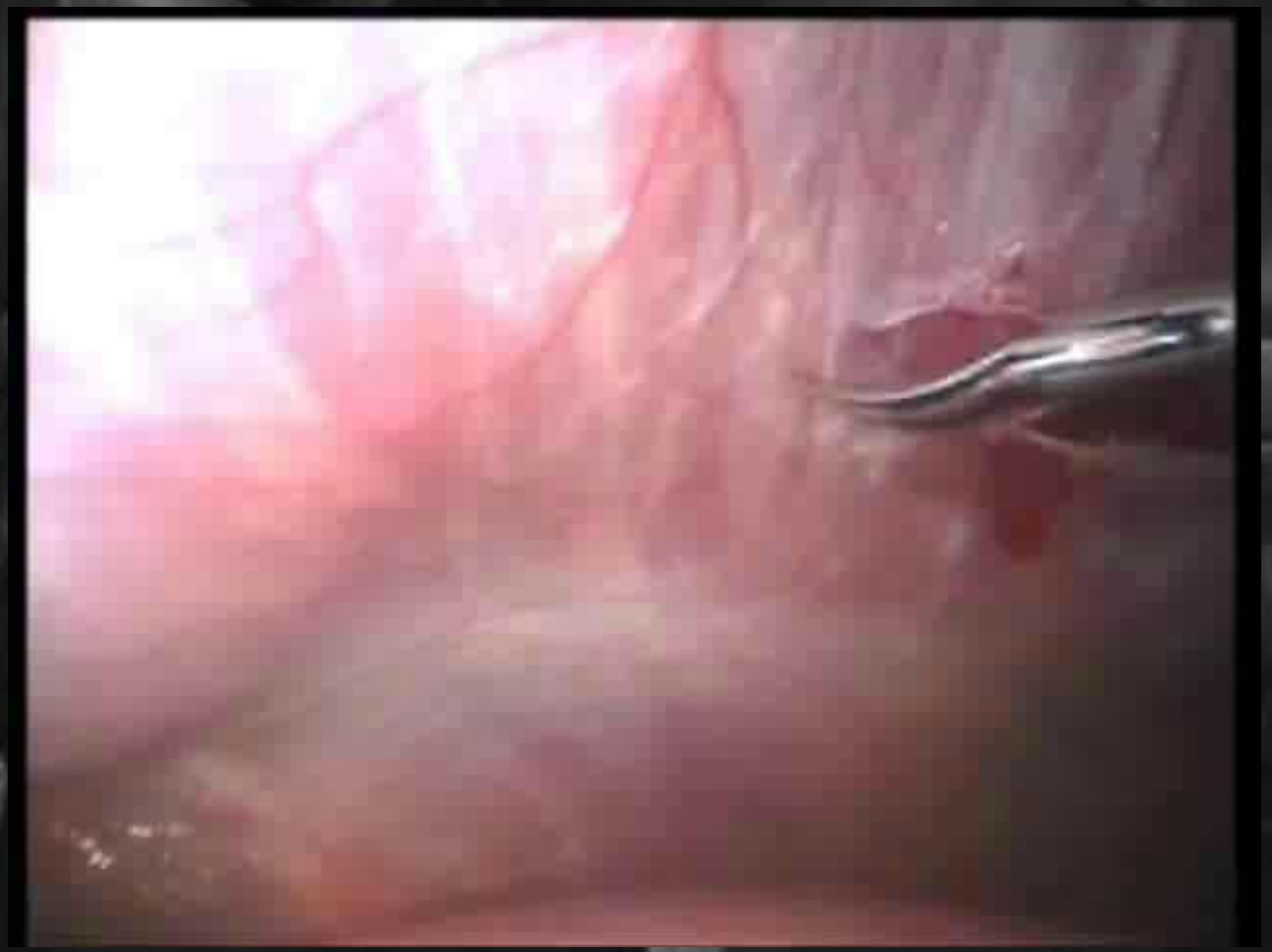
TWYDIL®

Surgical technique









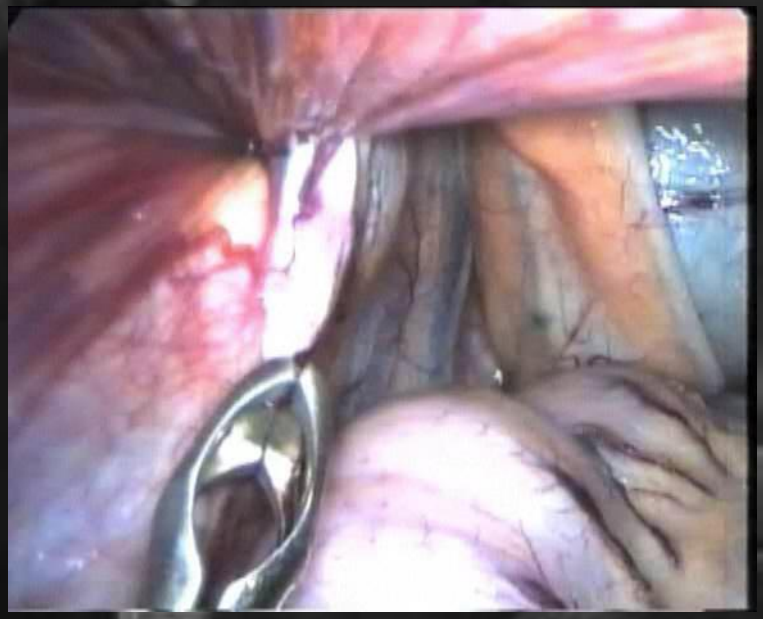
Follow up

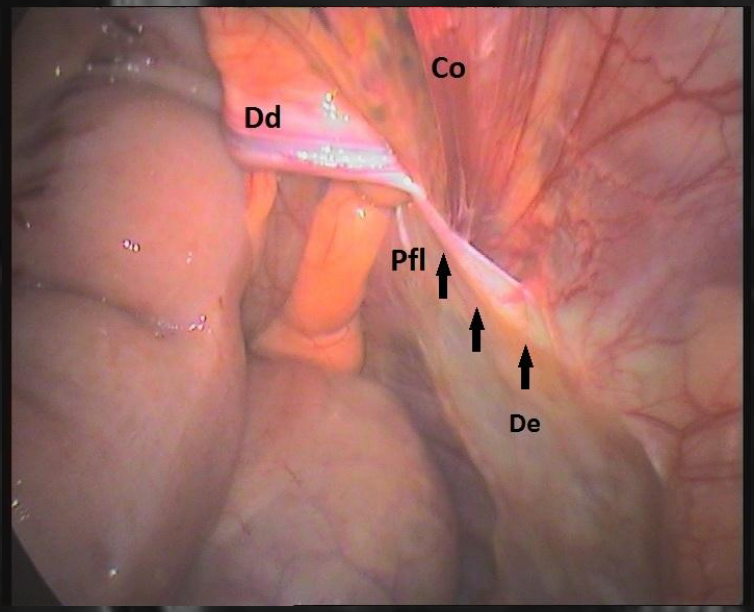
- Antibiotics 24 hours, Nsaids 3 days
- Horse discharged from hospital 48 hours post-op
- 8 days of strict stall rest, then hand-walking twice daily for two weeks then back to training
- Closure of the vaginal ring can be assessed after one month either by rectal palpation or when it is possible by direct viewing using a standing laparoscopy (performed in the first cases)

TWYDIL®

Results: standing laparoscopic check

- Vaginal ring no longer visible in all 9/10 first cases
- flap itself usually weakly adhered to the spermatic cord
- Spermatic cord = normal
- No adhesion between the viscera and the flap or its defect





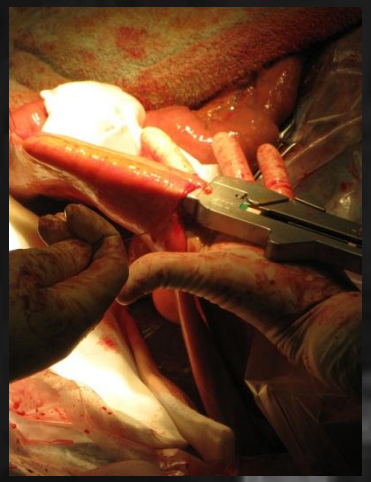
TWYDIL®

Acvs 2011

	Bred/age	Position	Anamnesis	Surgical site	Technique	Outcome	Spec. Comments
1	WB 4y	Recumbent	Inguinal canal strangulation obstruction – reduced surgically	Right	PFT	Success	Left hemicastrated Enterectomy + jejuno-jejunal anastomosis
2	WB 8y	Recumbent	Inguinal canal strangulation obstruction – manual reduction	Bilateral	PFT	Success	
3	WB 5y	Recumbent	Inguinal canal strangulation obstruction – reduced surgically	Bilateral	PFT	Success	
4	WB 7y	Recumbent	Inguinal canal strangulation obstruction – reduced spontaneously	Bilateral	PFT	Success	Previously operated using standing PFH recurrence
5	WB 5y	Recumbent	Inguinal canal strangulation obstruction – reduced surgically	Right	PFT	Success episodes of colic	Left hemicastrated Enterectomy + jejuno-caecal by pass.
6	WB 10y	Recumbent	Inguinal canal strangulation obstruction – reduced spontaneously	Bilateral	PFT	Success	
7	WB 10y	Recumbent	Inguinal canal strangulation obstruction – reduced surgically	Right	PFT	Success	Left hemicastrated Enterectomy + jejuno-jejunal anastomosis
8	**St 5y**	Recumbent	Inguinal canal strangulation obstruction – reduced spontaneously	Bilateral	PFT	Success	
9	WB/9 y	Recumbent	Inguinal canal strangulation obstruction – manual decompression	Right	PFT	Success	
10	WB/8 y	Recumbent	Inguinal canal strangulation obstruction – manual decompression	Right	PFT	Success	
11	WB/11 y	Recumbent	Inguinal canal strangulation obstruction – manual decompression	Right	PFT	Success	
12	TB/4 y	Recumbent	Inguinal canal strangulation obstruction – manual decompression	Left	PFT	Success	
13	STb/5 y	Recumbent	Inguinal canal strangulation obstruction – manual decompression	Right	PFT	Success	
14	WB/6 y	Recumbent	Colic surgery after inguinal strangulation obstruction - unilateral	Bilateral	PFT	Success, but show recurrent episodes of mild colic	Horse was preoperated with mash implant + developed local adhesions + colic

Standing hernioplasty techniques

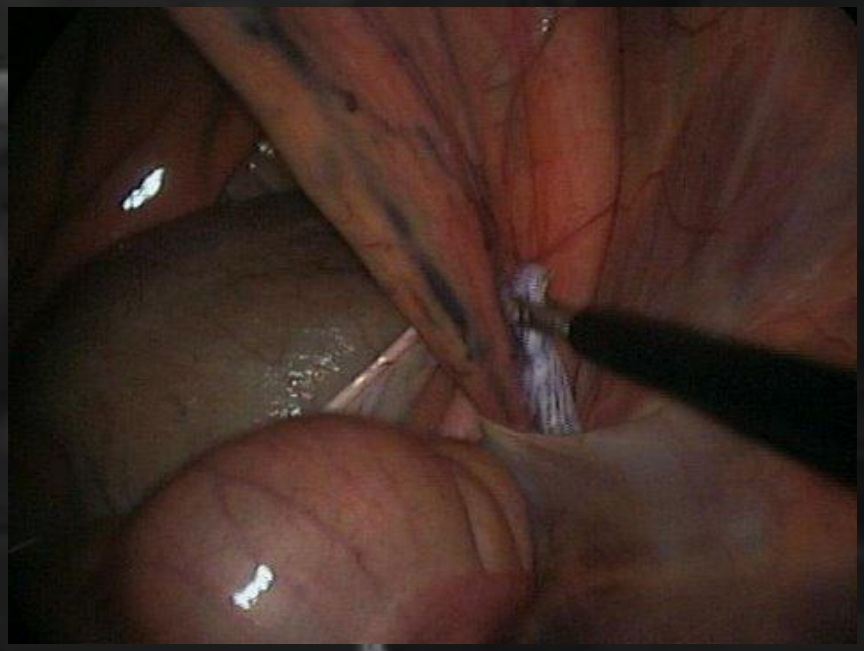
- Why?

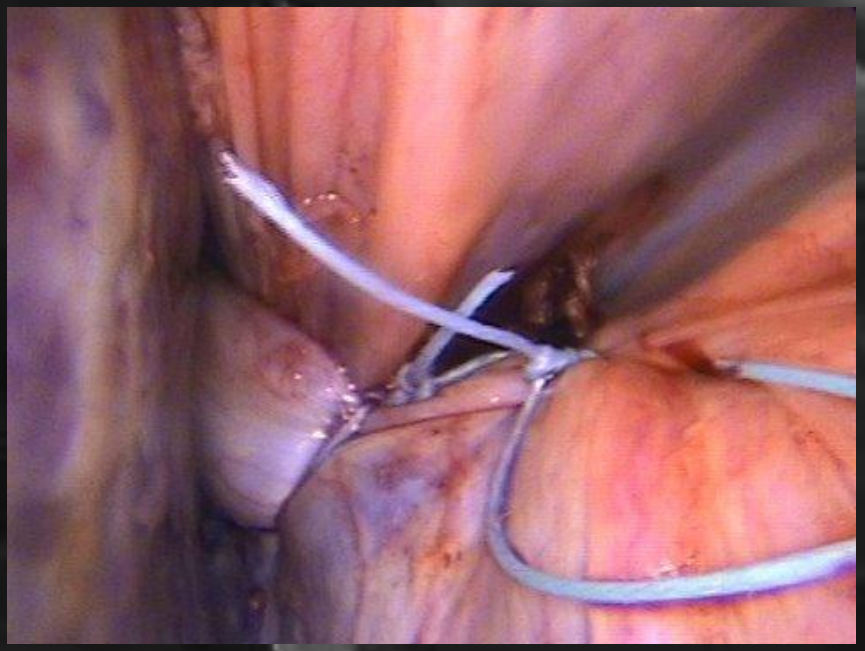


- Horses may have previous laparotomy +/- enterectomy
- Increased risk for GA
- No special equipment (tilt table)
- Owners and/or insurance companies ask for standing procedure
- Faster and/or easier to do?

TWYDIL®

Rolled mesh technique (Marien)



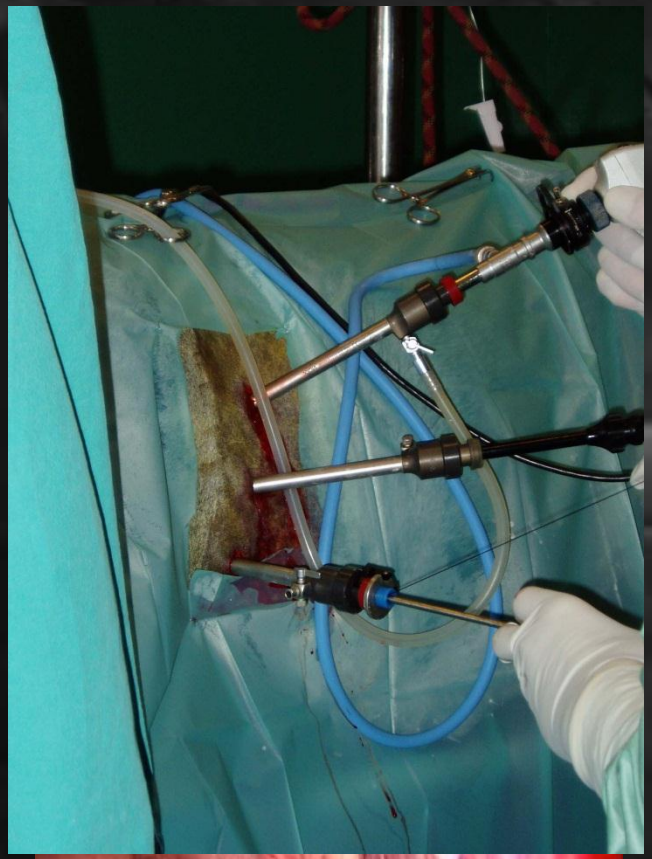


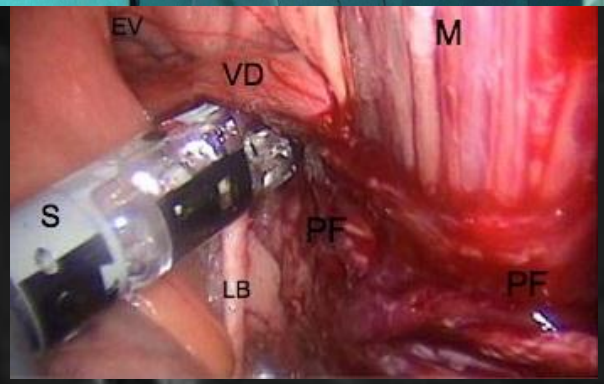
Courtezy H Wilderjans

TWYDIL®

Peritoneal flap hernioplasty on the standing horse

- Adapted from the recumbent technique
- Flap brought from dorso-lateral (cranial) to ventro-medial (caudal)
- Medial fixation: main part of the technique

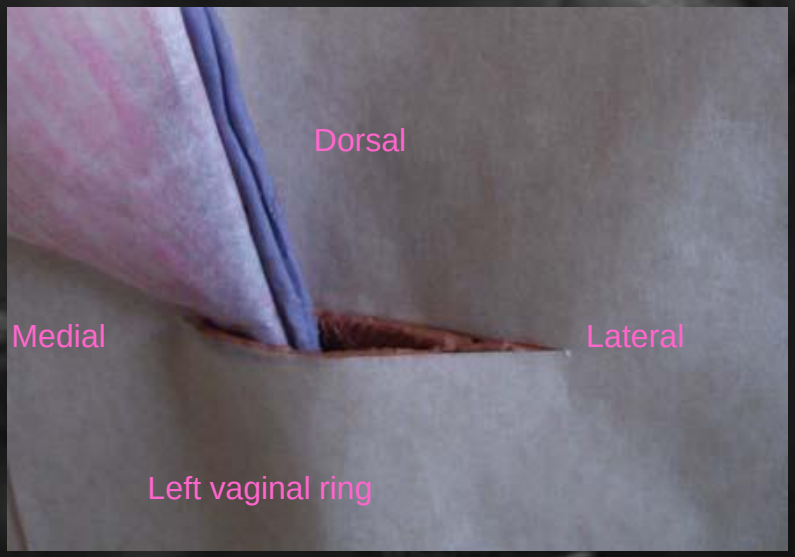


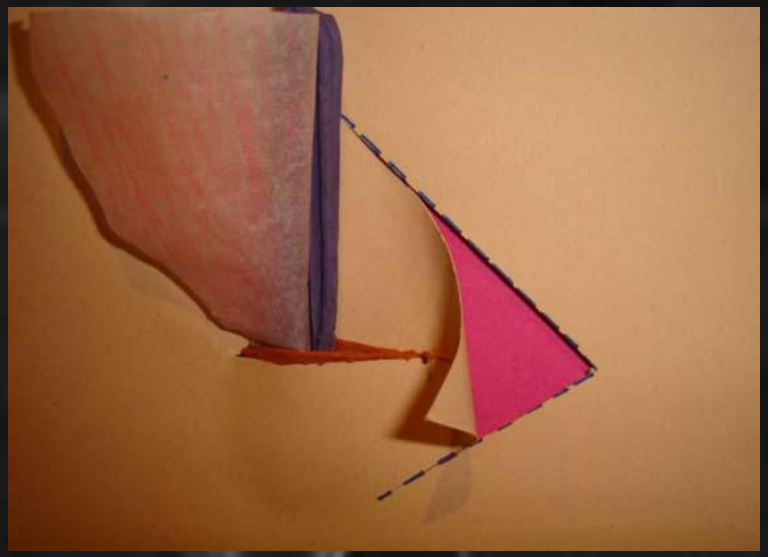


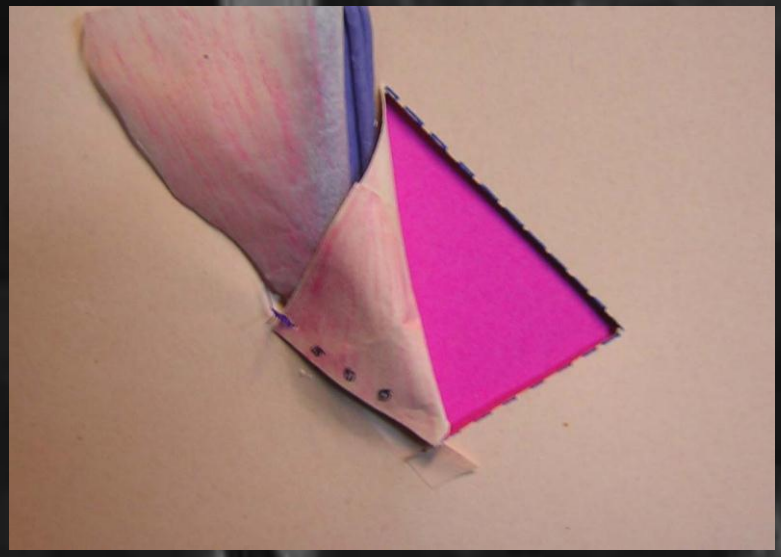
TWYDIL®

Surgical technique

Courtesy Dr M Moncada

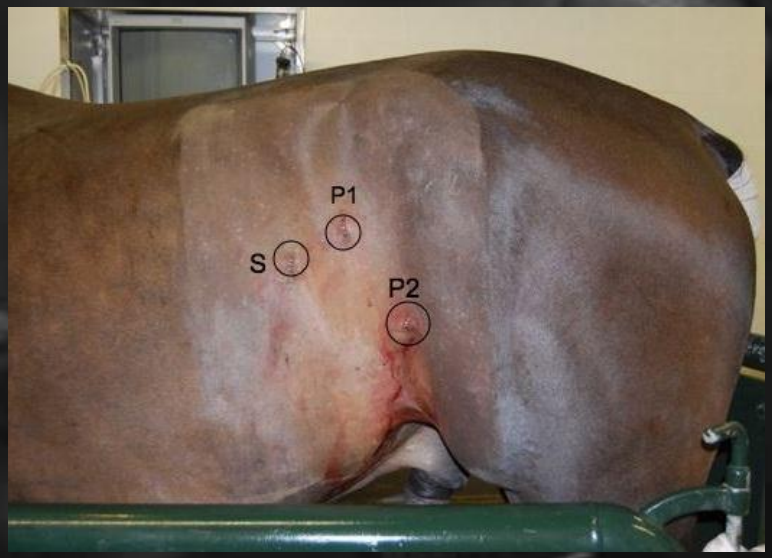


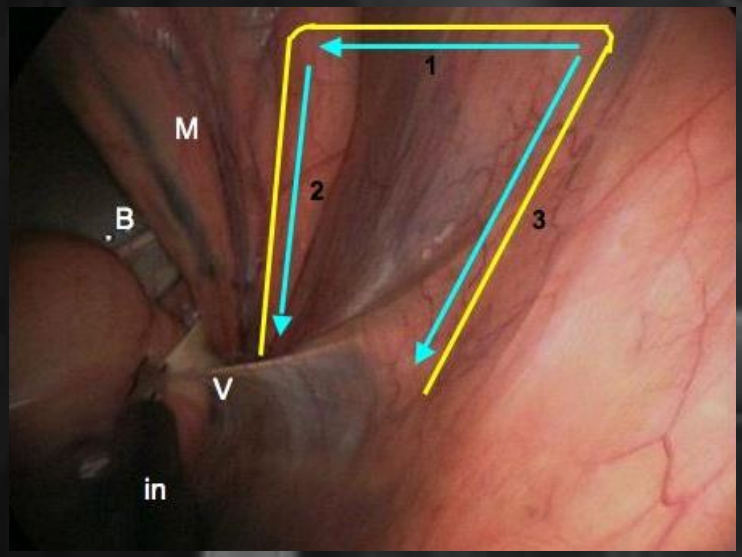


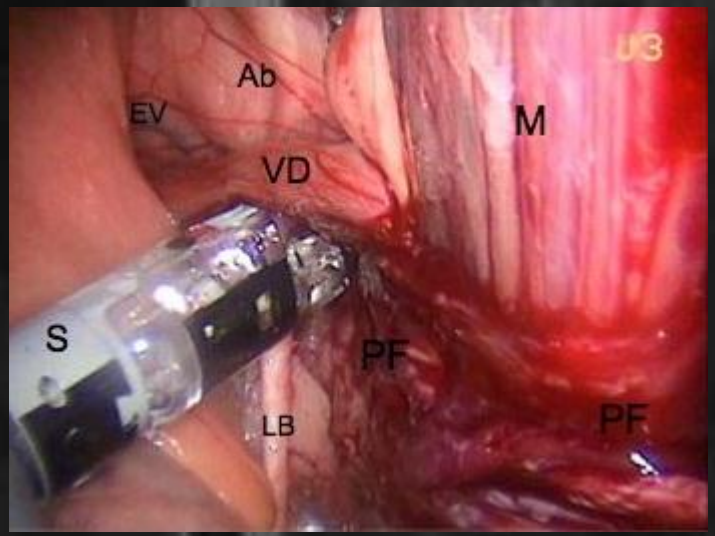


Surgical technique 2

Courtezy Hans Wilderjans





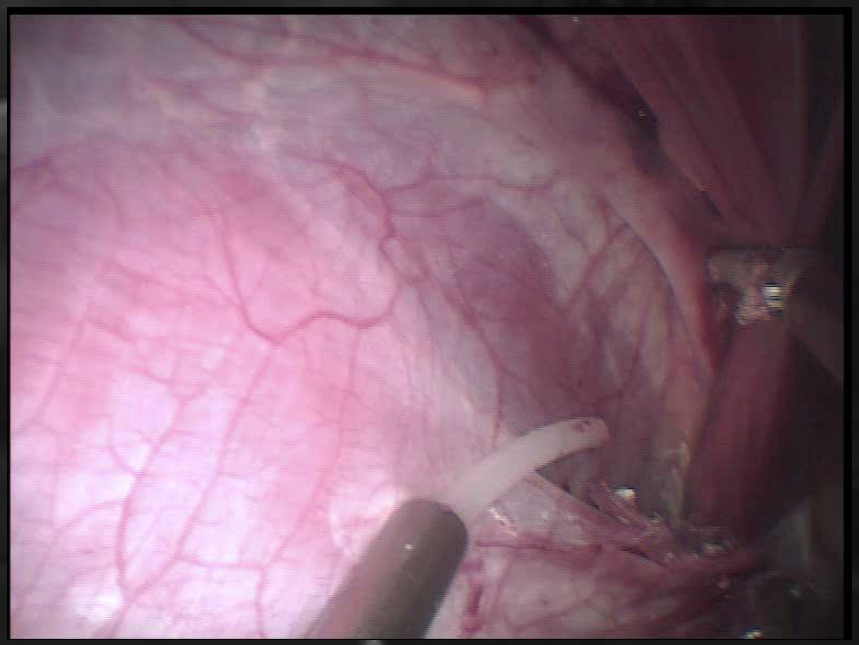


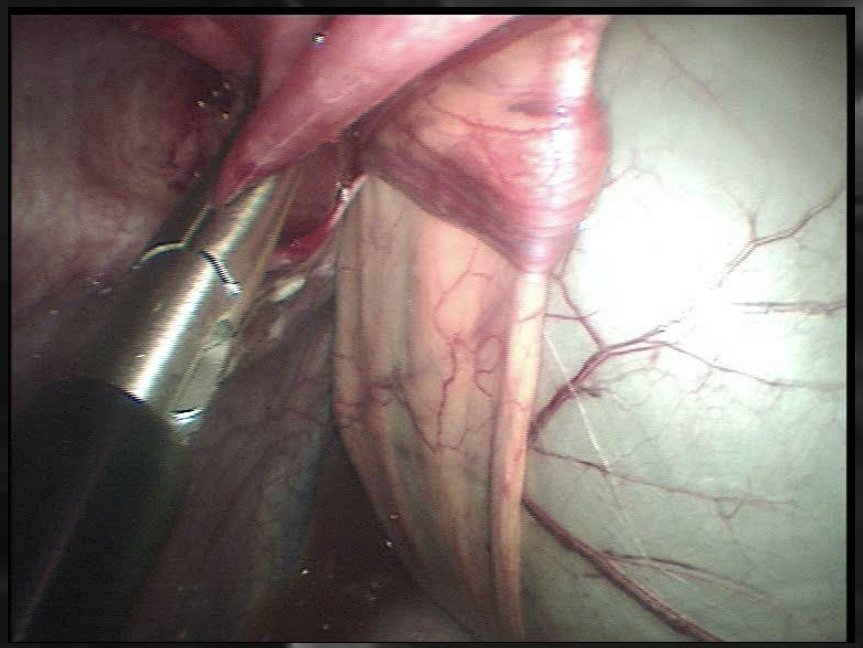
Results

- Retrospective study on 30 cases (Wilderjans, Vet surg 2012)
- No recurrence when flap placed caudo-medially
- No post op complications regarding performance and breeding

TWYDIL®

Inguinal hernioplasty using cyanoacrylate





TWYDIL®

Inguinal hernioplasty using cyanoacrylate

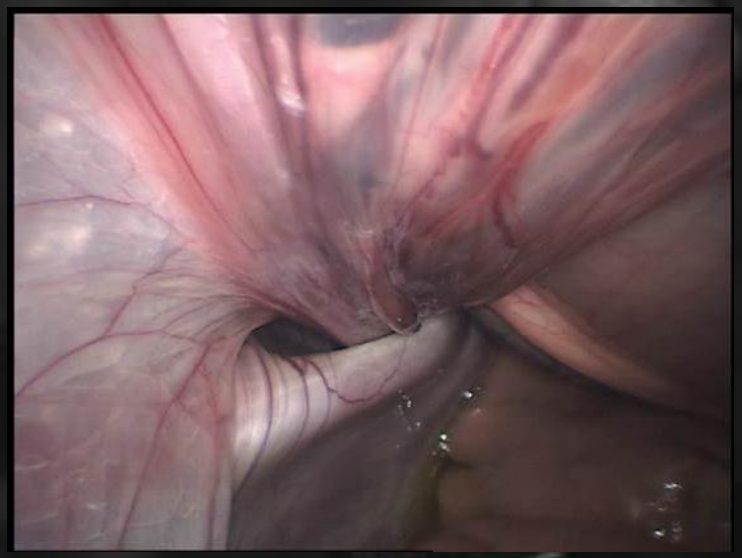
Results

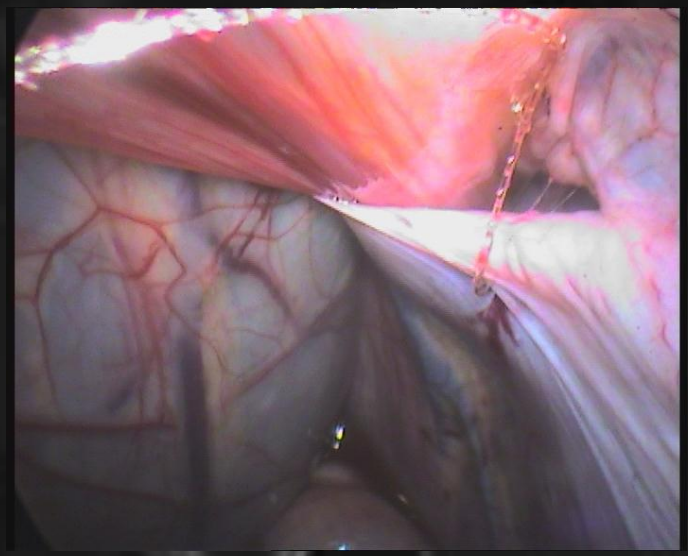
- F Rossignol, C Mespoulhes-Rivière, J Boening. Standing laparoscopic inguinal hernioplasty using cyanoacrylate. Proc ECVS 2012
- Eight adult horses
- Four normal horses with no history of inguinal hernia
- Four horses (clinical cases) with a history of inguinal hernia treated surgically or reduced spontaneously
- At 3 weeks post op: vaginal ring fully closed including the caudo-medial part
- No reherniation

TWYDIL®

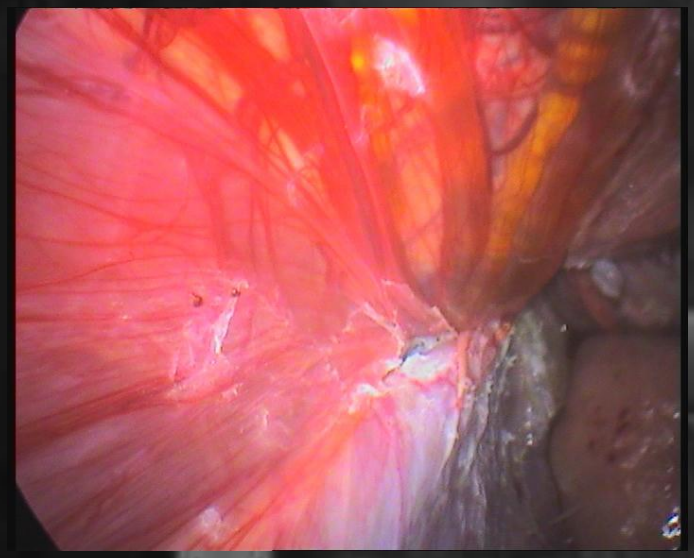
Inguinal hernioplasty using cyanoacrylate

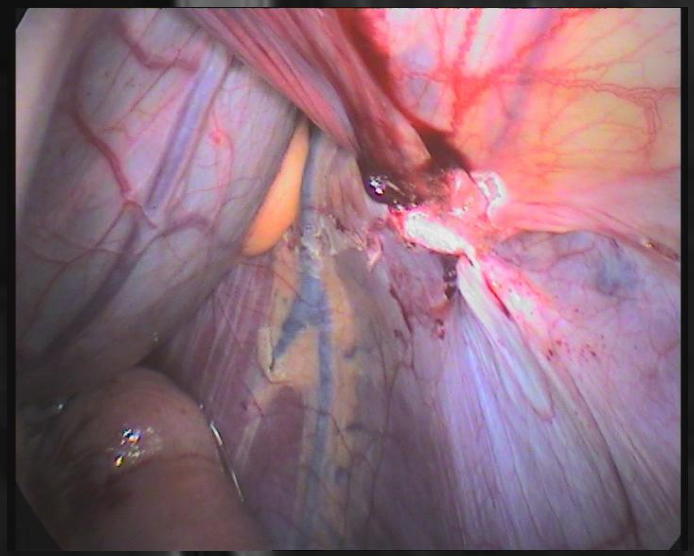
Preop





3 weeks postop





Laparoscopic ovariectomy

TWYDIL®

Laparoscopic ovariectomy

- Prévention of abnormal oestrus (pain,…)
- Behaviour affecting performance
- Sport or race mares
- No broodmare career expected!
- Bilateral procedure
- Equivalent of castration in the stallion

TWYDIL®

Laparoscopic ovariectomy

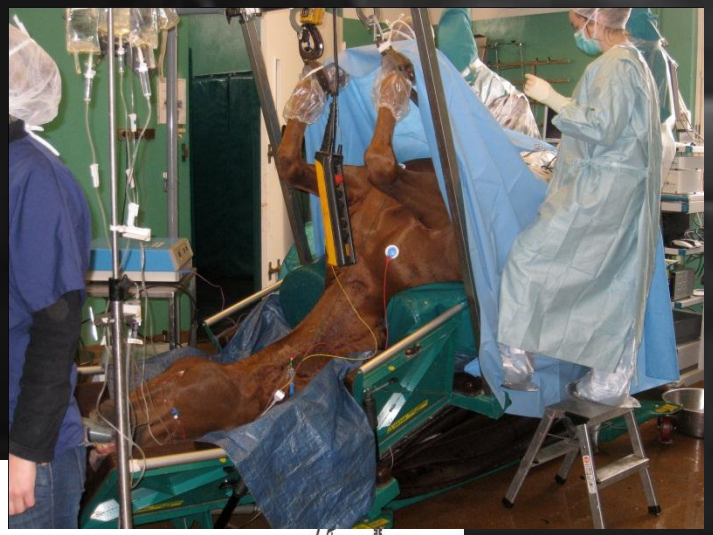
- Excision of an abnormal ovary, associated with altered behaviour and disturbed ovarian cycle + fertility
  - Granulosa cell tumor, dysgerminoma
  - Unilateral procedure

Laparoscopic ovariectomy

- Reference in laparoscopic surgery

  BOURE L., MARCOUX M., LAVERTY S. : Ovariectomie unilatérale par coeliochirurgie chez une jument. Prat. Vét. Eq., 1994, 26 (2), 129-132.

- Many techniques
  - standing vs recumbency
  - Laparoscopic portals
  - ian pedicle
  - nots
  - ips,
  - ples



Laparoscopic ovariectomy

- Reference in laparoscopic surgery

  BOURE L., MARCOUX M., LAVERTY S. : Ovariectomie unilatérale par coeliochirurgie chez une jument. Prat. Vét. Eq., 1994, 26 (2), 129-132.

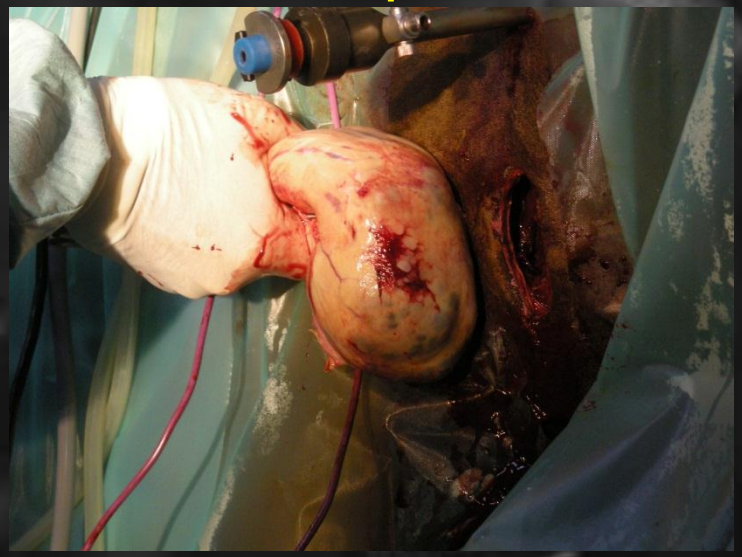
- Many techniques
  - standing vs recumbency
  - Laparoscopic portals
  - Hand assisted
  - Hemostasis of ovarian pedicle
    - Extracorporeal knots
    - Electrocautery
    - Ultracision
    - laser and endoclips,
    - Ligasure
    - Laparoscopic staples
  - Extraction

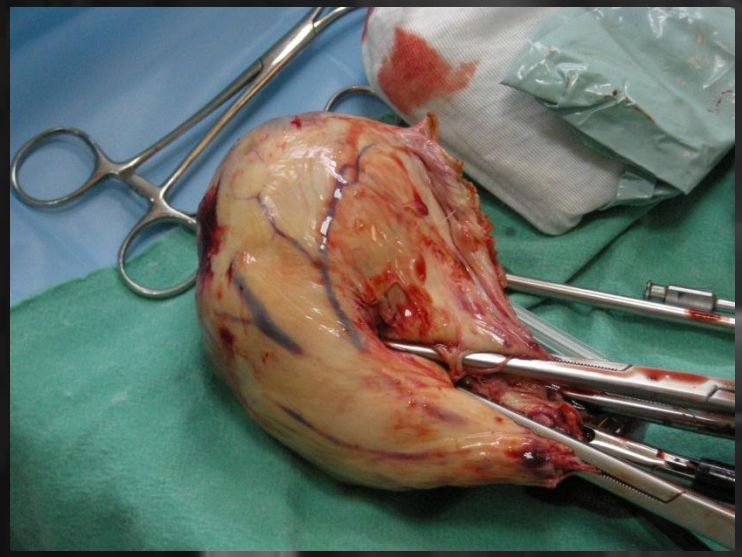
Unilateral ovariectomy for excision of an ovarian tumor (Granulosa cell tumor)

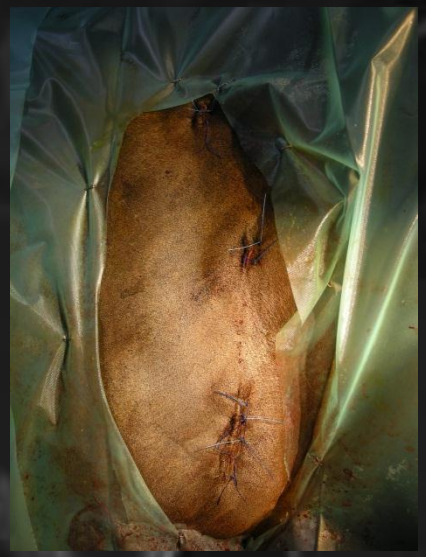
TWYDIL®

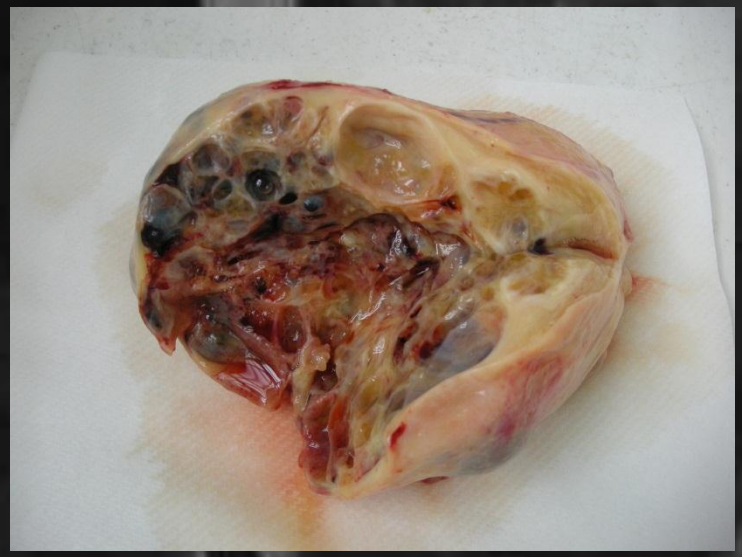
Unilateral ovariectomy for excision of an ovarian tumor (Granulosa cell tumor))

Extraction technique



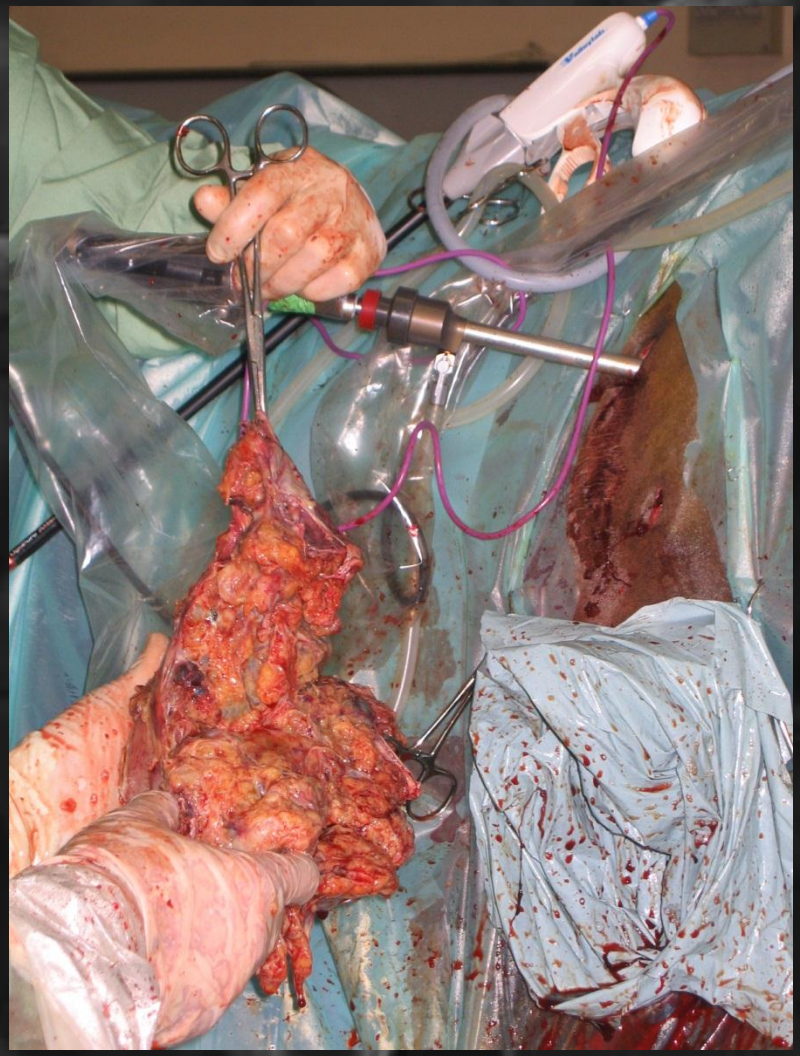






Unilateral ovariectomy for excision of an ovarian tumor (Granulosa cell tumor)

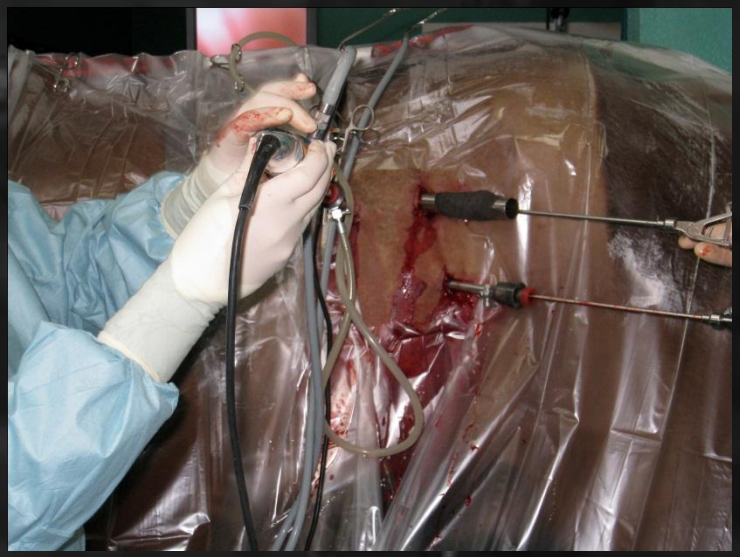
Extraction technique

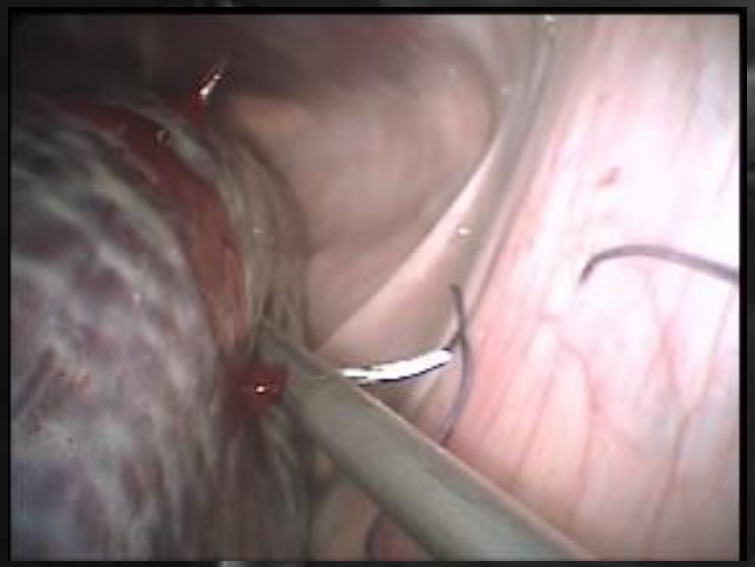


Unilateral ovariectomy for excision of an ovarian tumor (Granulosa cell tumor)

Extraction technique

Nephrosplenic space closure





TWYDIL®

Nephrosplenic space closure

- Left dorsal displacement of the large colon into the nephro-splenic space
- Complete entrapment(≠ partial displacement)
- Fréquent (6% of colics)
- médical vs surgical treatment
- 21% recurrence(Röcken 2005)

Nephrosplenic space closure

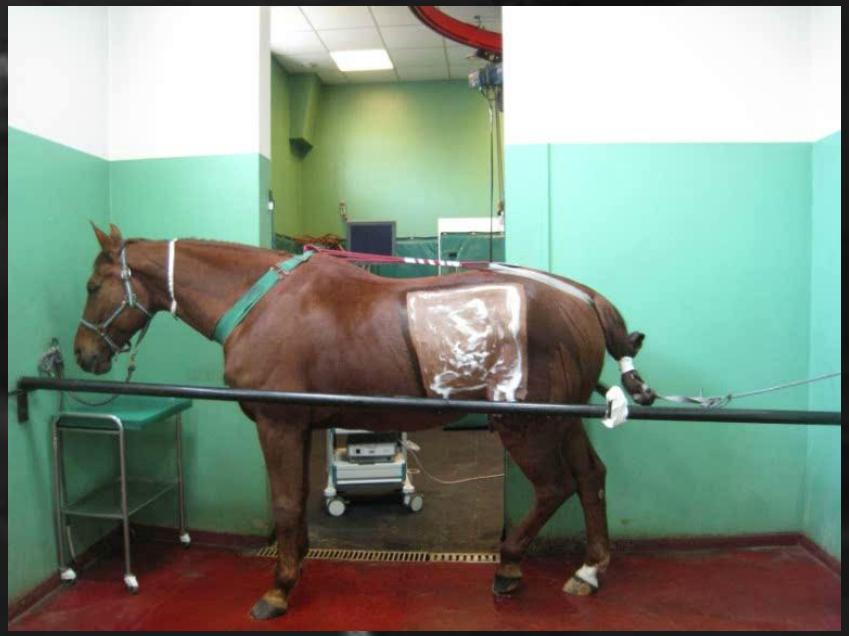
Indications

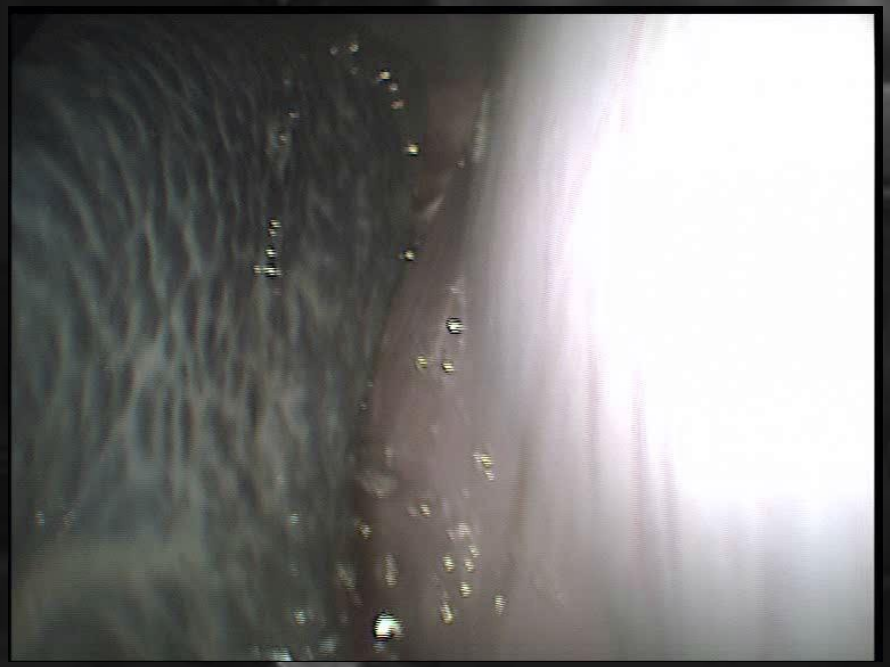
- Prévention of recurrences
- Evaluation of risks: difficult
- At least two entrapment?
- One surgically treated after owner's information

Nephrosplenic space closure

Technique

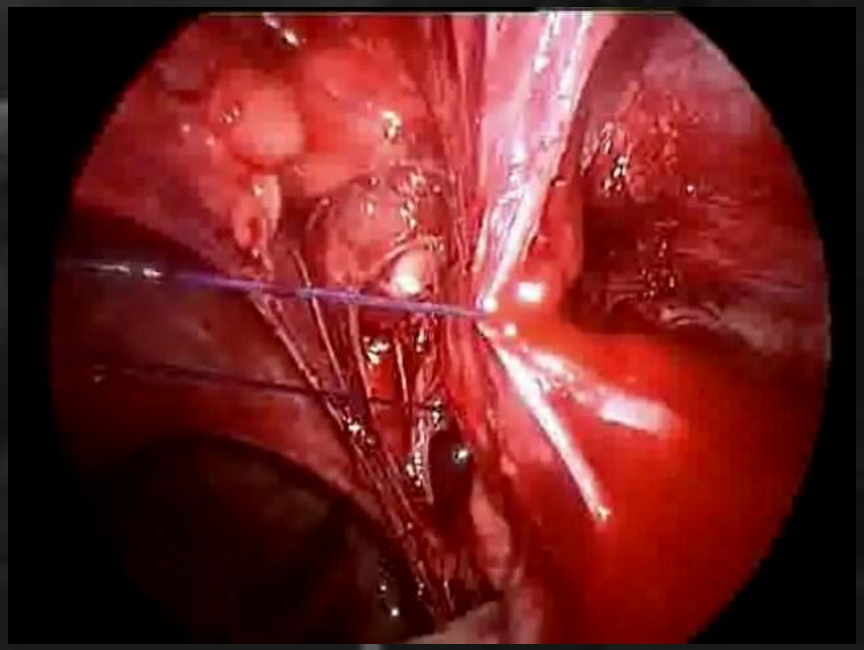
- Adapted from Mariën

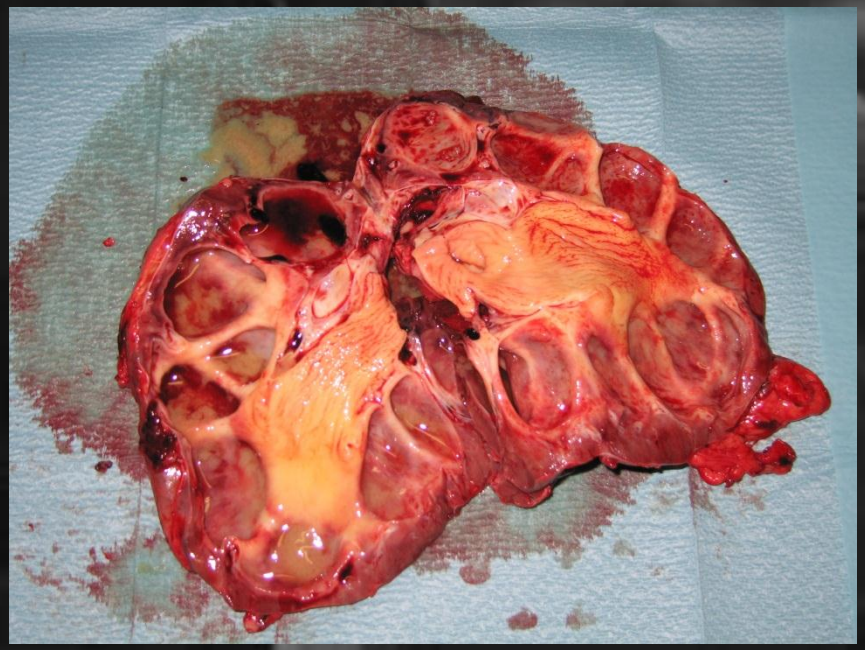




TWYDIL®

Laparoscopic nephrectomy





TWYDIL®

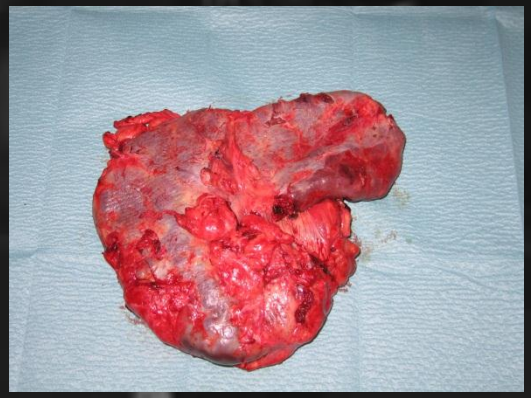
Laparoscopic nephrectomy

Indications

- Chronic hematuria
- Hydronéphrosis
- Abcess
- Néoplasia
- Ectopic uretera
- Néphrolithiasis
- Pyélonéphritis
- Nématodiasis

Laparoscopic nephrectomy

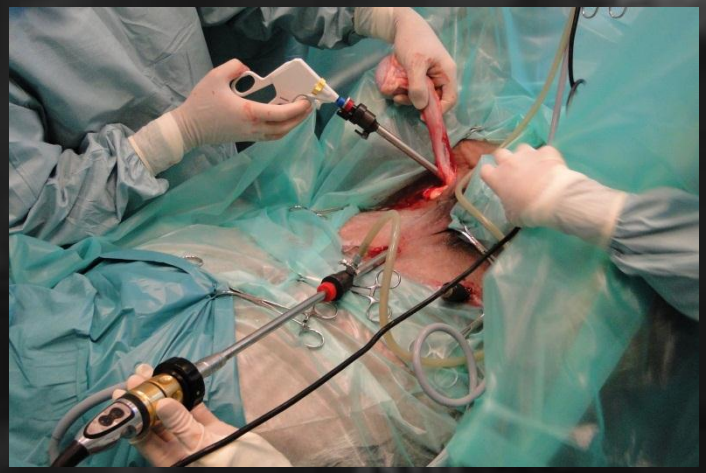
- Standing
- Right: retroperitoneal
- Hand assisted less difficult
- Faster with ligasure

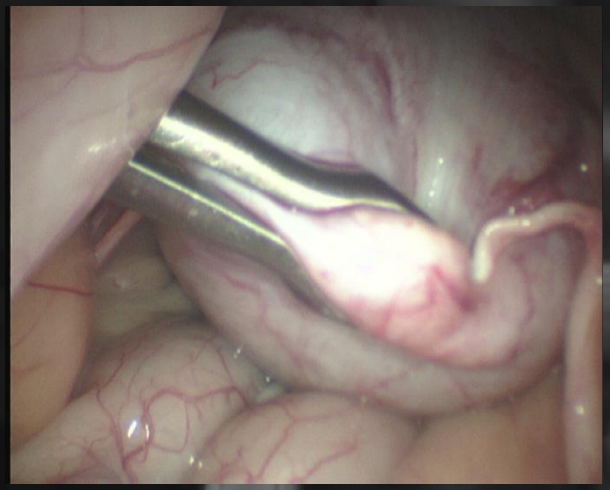


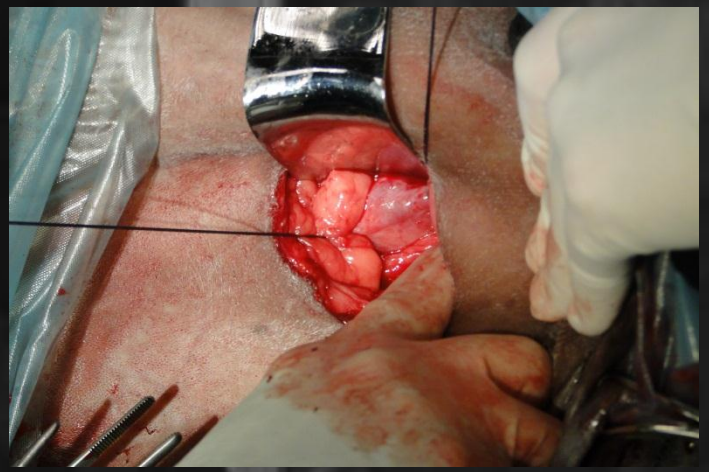
Laparoscopic bladder surgery calcul removal

- Uretrostomy
- Laparocystotomy
- Full laporoscopic technique (Raggle)
- Laparoscopic assisted (Röcken)
  - Laparoscopic visualization of the bladder
  - Prehension
  - Exteriorization via parainguinal approach (Röcken)
  - Inguinal approach possible in stallion
  - cystotomy

Laparoscopic calcul removal

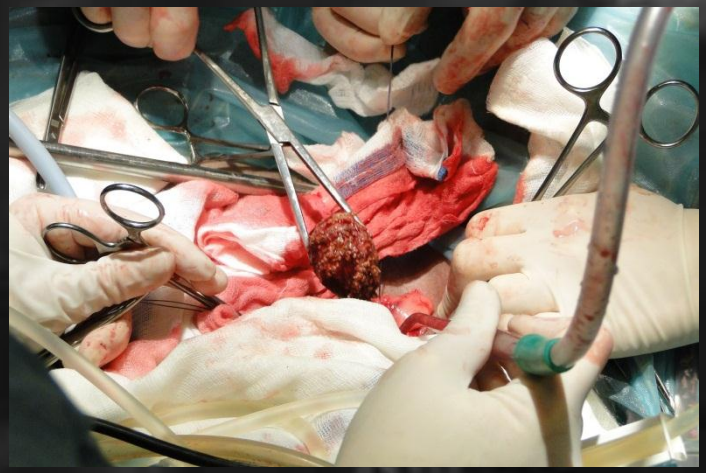


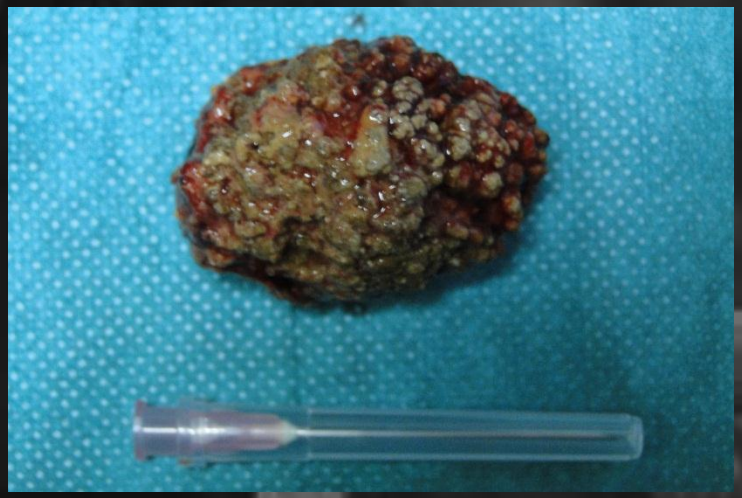


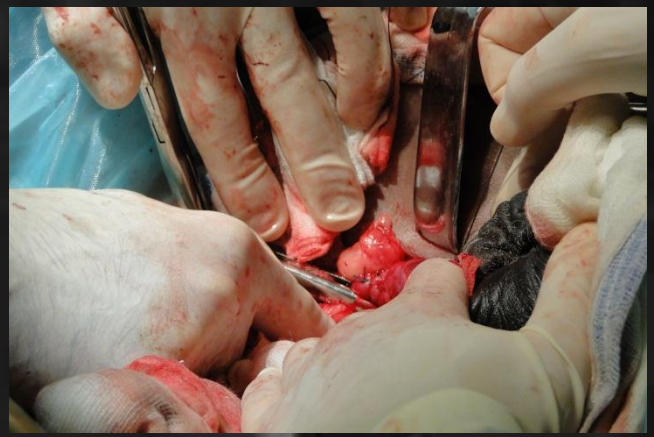


TWYDIL®

Laparoscopic calcul removal







TWYDIL®

Conclusion

Indications of laparoscopy :

- Développement ++
- Limited to our imagination
- Training = vital (for the horse!)
- futur:
  - New instruments (Ligasure ND, agrafes,…)
  - Laproscopic assisted techniques

TWYDIL®

Conclusion

- Don’t forget good sense
- Alternatives to technology failure