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#### Some history:

- Slides from Stephen May, UK
- Hobday, figure 16 in the 1924 edition of *Surgical Diseases of the Dog and Cat* by Frederick Hobday
- Anaesthesia and surgery: sophisticated approaches, but still inducing both large and small animals **after** restraint!



FIG. 16.—GRAY'S OPERATING RACK ATTACHED TO AN ORDINARY TABLE, WITH A CAT FIXED IN THE 'ABDOMINAL' POSITION.



ARNOLD BONE LONDON

- Flank approach is common in the UK
  - Large animal vets were used to standing patient
  - Letters to the editor: "How to spay a cat?"

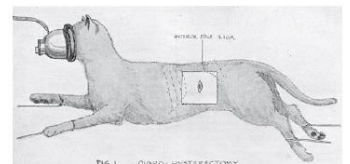
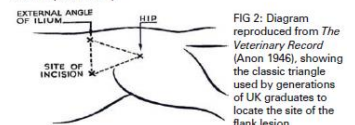


FIG 1: Diagram reproduced from *The Veterinary Record* (Wright 1933), showing a method of restraint and site of incision for ovariohysterectomy



Editorial Stephen May; *Veterinary Record*, May 5, p 460-461, 2012

## Benefit dog spay

- Prevent heat
- False pregnancy
- Lower risk of mammary tumors
- Lower risk of diabetes
- Avoid pyometra
  - Dogs not spayed: 25% of dogs will get pyometra up to 10 years of age. Hagman 2004

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## Age at castration – guideline?

- Dogs: 4 months? 6 months
- Cats: 3 months? "Student castration" 6 months

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## Gonadectomy and longevity

In primates females live longer. In dogs?

... We observed only a small effect of sex on canine longevity. We discovered a small male advantage in survival among intact dogs but a clear female survival advantage among neutered dogs. Overall, the effect of neutering on life span was greater than the effect of sex.

Hoffman et al, Do Female Dogs Age Differently Than Male Dogs? 2017.

DOI: [10.1093/gerona/glx061](https://doi.org/10.1093/gerona/glx061)

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## Decrease risk of mammary tumors

- Malignant tumors – must spay before 3rd heat

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## Effect on benign mammary tumours?

- Yes!
- Reduced risk also at late spay
  - However, the risk for benign MT development appears to be reduced by GX even at a later age (Phillips 2002)
  - Same results insurance data, PhD thesis P. Rivera 2010 (Schneider 1969: malignant tumors...)
- Increased risk of bone tumors?
  - The risk increases, but from low risk levels

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## Castration at surgery for tum. mam?

- Ovariohysterectomy performed at the time of mammary tumor excision reduced the risk of new tumors by about 50%
- No effect on survival
- Kristiansen, Effect of ovariohysterectomy at the time of tumor removal in dogs with benign mammary tumors and hyperplastic lesions: a randomized controlled clinical trial. J Vet Int Med 2013

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## Positives and negatives

- Inform the owner!

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## Complication:

- Urinary incontinence is uncommon in intact bitches

A common side effect to spaying – 3-21%

Immediately or many years later

If incontinent usually (75%) within 3 years

Higher risk if dog is over 20 kg

Spaying shortly before puberty: 50% lower risk

Higher risk if spayed before 3 months of age

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- Of 100,397 bitches attending 119 clinics in England, an estimated 3108 were diagnosed with urinary incontinence. The prevalence of urinary incontinence was 3.14%
- Urinary incontinence affects just over 3% of bitches overall but affects more than 15% of bitches in high-risk breeds including the Irish setter, Dobermann, bearded collie, rough collie and Dalmatian.

O'Neill et al, Urinary incontinence in bitches under primary veterinary care in England: prevalence and risk factors. JSAP 2017

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## Treatment urinary incontinence

- Propaline Vet. Phenylpropanolamine is a sympathicomimeticum, stimulates  $\alpha$ -adrenergic receptors
- (Incurin: estriol, short acting oestrogen for the treatment of hormone-dependent (estrogen) urinary incontinence)
- Drugs will effect sphincter muscles of urinary pathways

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## Complication: Body weight...?

Neutered cats 3 times likely to become overweight  
Those cats are more likely to develop diabetes

Conflicting evidence in dogs



Pressroomvip.com

## Effect on mental attitude?

- Dogs in the ovariohysterectomized group showed more reactivity.
- ... OHE may induce an increase in reactivity
  - Kim, Effects of ovariohysterectomy on reactivity in German Shepherd dogs, The Vet J 2006

VOV! \_\_\_\_\_  
After surgery: VOV! \_\_\_\_\_ (meters)



## Racing dogs:

- There were no differences over time between entire and spayed greyhounds
- No significant short or long-term effects of spaying on performance
  - Payne RM. The effect of spaying on the racing performance of female greyhounds. Vet J. 2013

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## Are you worried about canine OVH?

- Which surgical procedure are you most worried about performing as a new graduate in your first job?"
- 81% (60/74) indicated that they were most worried about canine OVH

12.2% (9/74) indicated surgical correction of gastric dilation volvulus (GDV),

5.4% (4/74) indicated feline ovariohysterectomy and 1.4% (1/74) indicated canine caesarean section.

REF Bowlit 2011

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## Bitch spay – surgical complications...

- New beginners failed in 8/10 ligatures in large breed dogs.  
– Berzon, Vet Surg 1979
- Several studies: 5 % intraoperative complications – bleeding
- The most common cause of death following ovariectomy is haemorrhage  
– Pearson, JSAP 1973

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## Bitch spay – surgical complications...

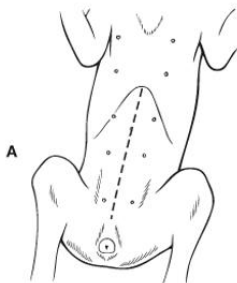
- Incidence of gastroesophageal reflux (GOR) occurs with a high incidence in dogs in the second half of pregnancy Anagnostou, Vet Anaest Analg 2014
- Large and heavy dogs + long duration of surgery increased risk of complications. Muraro, Tierarztl Prax Aug 2014
- Practice makes perfect: Surgery time decreased in a linear manner as experience increased for ovariectomy of adult dogs

Freeman, Evaluation of learning curves for ovariectomy of dogs and cats and castration of dogs, J Am Vet Med Assoc. 2017

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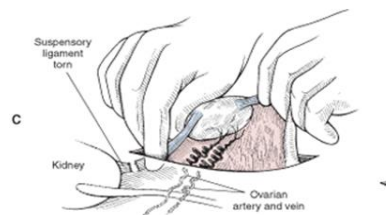
## Fossum:



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## Bitch spay, image 27-5 in Fossum

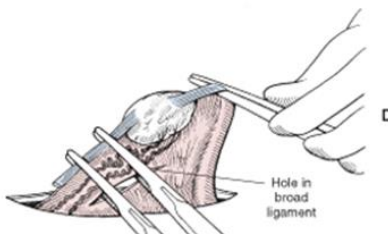


Generally you can leave the suspensory ligament intact

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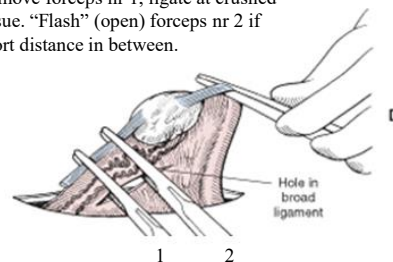
Ligatures are placed at crushed tissue



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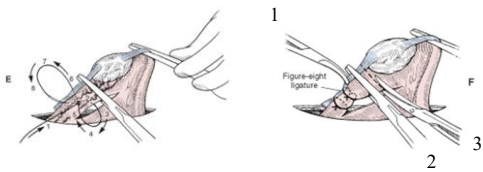


Remove forceps nr 1, ligate at crushed tissue. "Flash" (open) forceps nr 2 if short distance in between.



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- Suggest start with circular ligature
- Distal ligature may be anchored
- Cut tissue
  - Dorsal side of forceps – compare image

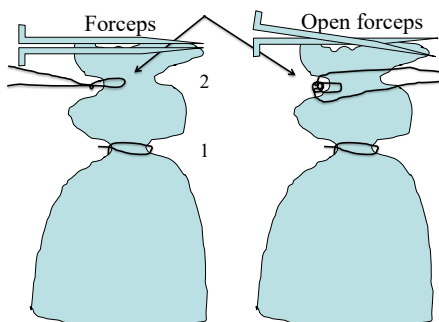
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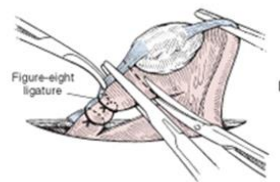
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- Why anchored ligature?
  - Prevent ligature nr 2 to slide into same groove as 1st ligature.
  - Prevent slip-off?



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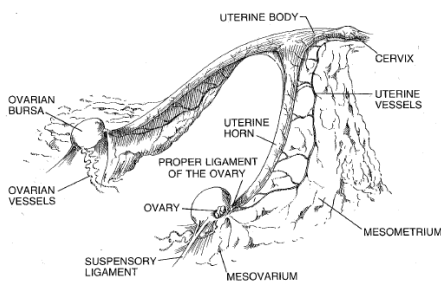
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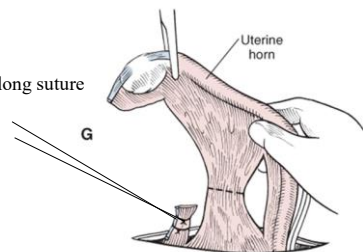
- 1. Cut the tissue – inspect!
- 2. Cut between two pairs of forceps, escort tissue into abdomen, then inspect tissue!

- ALWAYS inspect the ligatures!
  - Follow the mesometrium
- Slatter, Textbook of small animal surgery, 1993, fig 98-1

1488 Reproductive System

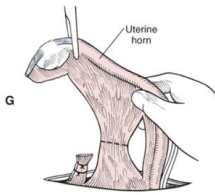


Some leave long suture



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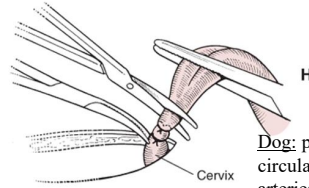


- Lig lata / Broad ligament:
  - Dog: ligate
  - Cat: tear off (ligate if large vessels)

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Cervix: Cat, in heat: hyperplasia of tissue – risk of mosquito or suture cutting through tissue



Dog: prefer double ligation, or circular + separate ligation of arteries

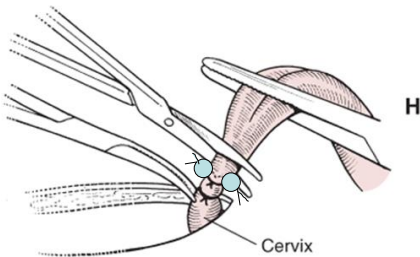
Cat: tradition is one circular

- Pyometra: ONE circular ligature. Good to add separate ligatures on the arteries

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The pyometra case:

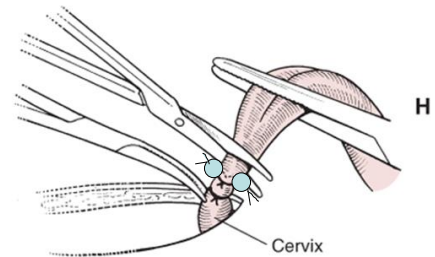


- IF two circular: "compartment" – "cervical abscess" or "stump pyometra"

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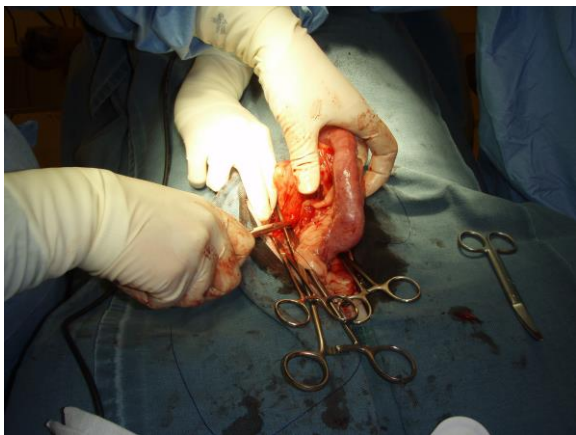


The pyometra case:



- Perhaps "burn" – cauterization of lumen at cervix. Evidence of benefit?

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**Pyometra**

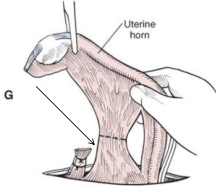


Bild R Hagman

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## How to find and check the ligature

- Move the colon
- From *ligamentum latum* / *mesometriet* – continue in cranial direction



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## Closing...

- Suture materials – Friday's lecture

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- Several surgical approaches have been described for neutering of female dogs (Howe, 2006).
- Ovariohysterectomy (**OHE**) means that the ovaries and uterus are removed, whereas in ovariectomy (**OE**) only the ovaries are removed.
- It has been shown that leaving the uterus is not associated with an increased risk of morbidity, provided no adverse uterine pathology exists at time of surgery (Van Goethem *et al.*, 2006; Okkens *et al.*, 2003; Okkens *et al.*, 1997).

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## OE or OHE? Preferences? In Sweden usually OHE

- OE vs OHE – shorter vs longer wound
  - No difference in pain? Peeters 2011
- OE vs OHE – both OK (if uterus is normal)
  - Van Goethem *et al.*, 2006; Okkens *et al.*, 2003; Okkens *et al.*, 1997
- Results suggested that **short- and long-term outcomes** were similar for female dogs undergoing sterilization by means of **LapOVE or LapOVH**
  - Corriveau, Giuffrida, Mayhew, Outcome of laparoscopic ovariectomy and laparoscopic-assisted ovariohysterectomy in dogs, 278 cases, JAVMA. 2017

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## Postoperative analgesia

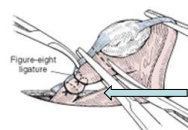
- Many different suggestions
- Morphine or methadone + NSAID
  - Methadone in clinic, NSAID for ca 5-10 days (dog), 3-5 days cat

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## Research

- New method for ligation – tested at ovarian pedicle – the LigaTie



www.LigaTie.com

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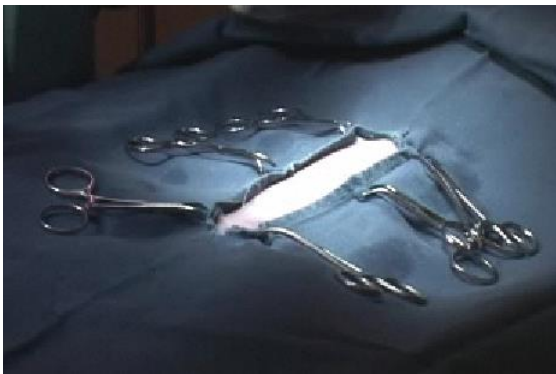




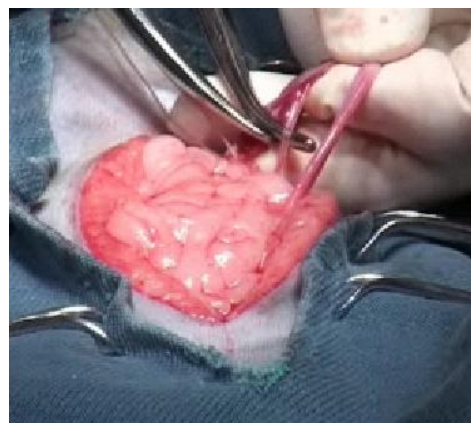
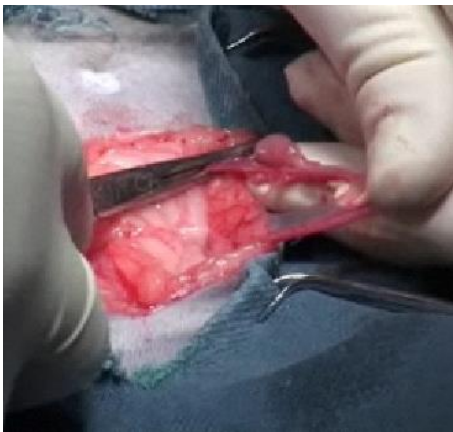
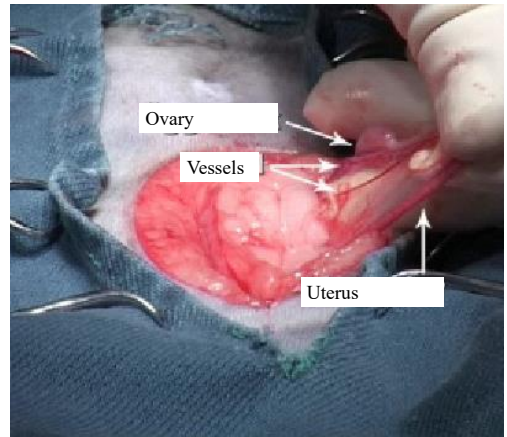


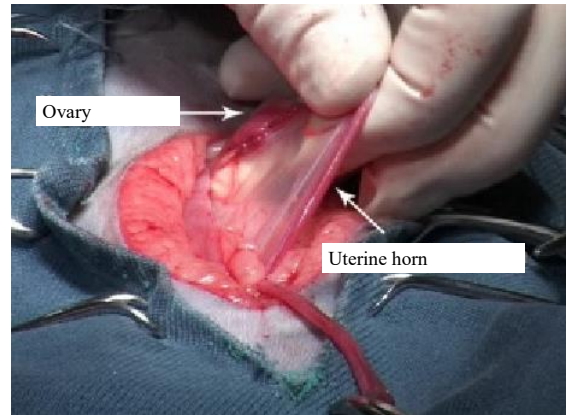
- Alternative methods:
- Elektrocoagulation vs suture, 2,22 vs 4,10 min.  
Time for one ovary, elektrokoag vs double ligation  
– Schwarzkopf 2014
- LigaTie® vs single ligature, 3'28" vs 5'29".  
Time for two ovaries, LigaTie® vs simple ligation  
– [Da Mota Costa 2016](#)  
– <https://bmcrsnotes.biomedcentral.com/articles/10.1186/s13104-016-2042-2>

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**Generally: always careful handling with tissue**

- And ALWAYS inspect the ligatures

### Compare LIGATIONS dog/cat and pyometra/healthy

- Lig. ovaries cat: single      dog: double
  - Double if unsure
- Mesometrium cat: tear      dog: ligate
- Cervix cat: single      dog: double or separate lig. arteries
- Pyo. cervix: cat: single      dog: single and separate lig arteries. Do NOT create "compartment"

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### Questions?



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