TRANSCERVICAL INSEMINATION (TCI) IN THE BITCH

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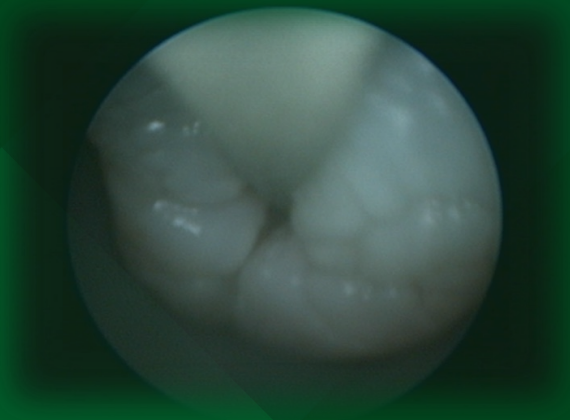

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HISTORY OF TCI

CLINICAL THERIOGENOLOGY 0195-5616/01 $15.00 + .00

TRANSCERVICAL INSEMINATION TECHNIQUES IN THE BITCH

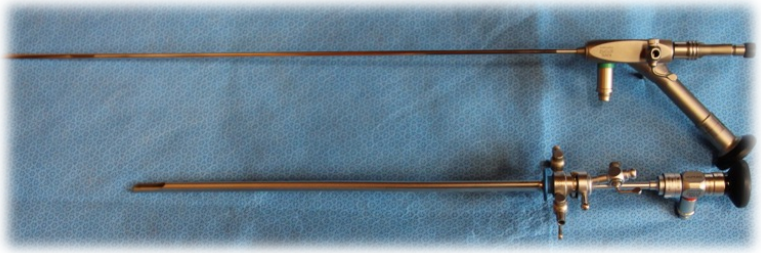
Marion S. Wilson, BVMS, MVSc, MRCVS

The technology to freeze and inseminate frozen semen has been around for over 30 years, but it is only relatively recently that there has been an upsurge in its use as breeders take advantage of the benefits it offers to their breeding programs. This increased use is mainly because of the improved conception rates now being achieved as a result of determining the critical factors for success. Defining the optimum time for insemination and developing methods for determining this critical time have had a significant impact on improving the success rate; also important has been the recognition that thawed semen should be deposited by intrauterine means rather than vaginally.[1, 2, 4, 10] This overcomes the effect that processing has on the ability of the sperm to migrate through the cervix and reduces the sperm dose perceived as required per bitch.

The options to achieve intrauterine semen deposition are by surgical or transcervical insemination (TCI). In many parts of the world, the surgical option is the method of choice because it is easy to perform and has no major learning period. Surgical insemination has some drawbacks, including the risk associated with general anesthesia and surgery and the fact that only a single insemination is realistic (and ethically acceptable). Many owners and veterinarians prefer a nonsurgical transcervical option; in some countries, it is considered ethically unacceptable to perform intrauterine insemination surgically. Previous reports have indicated that TCI is not possible or that it is feasible only in the anesthetized bitch. More recently, techniques that contradict these opin-

From Glenbred Artificial Breeding Services Ltd, Feilding, New Zealand

- Developed by Dr Marion Wilson in 1988, New Zealand
- Modified human cystourethroscope
- In 2006 Minitube™ with Storz™ modified the human ureteroscope= veterinary hysteroscope or TCI endoscope



- **The original TCI scope was short and wide with a sheath**
- **The newer 'TCI scope' is long and thin and has made the TCI procedure significantly easier to perform in bitches of all sizes**

ENDOSCOPE DEVELOPMENTS WITH TCI

Feature	Original Cystoscope	Newer TCI/Ureteroscope	Advantages of new TCI scope
Length	29 cm	43 cm	TCI scope much longer- no bitch's cervix is out of reach
Viewing Angle	30° oblique	6°	30°= visualize entire vagina= ideal for vaginoscopy 6°= allows positioning in front of the cervix= facilitate catheterisation
Diameter	22Fr Outer sheath	9.5-13.5 Fr conical 1 step No sheath	TCI scope much thinner=easier to manipulate in PC area \ and pass under DMF esp in small breeds Can pass into external os – facilitate catheterization
Working chanel	8 Fr instruments	5 Fr instruments	See catheters

TCI scope much easier to use, can manipulate cervix easier, catheterization easier, get under the DMF without causing discomfort = become more efficient and perform TCI technique in shorter period of time

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OBJECTIVES OF TCI

- Intrauterine deposition of semen
- Non - invasive
- Repeat inseminations
- Pregnancy rates and litter size equivalent to all other IUAI techniques
- No sedation and minimal restraint
- Application to all bitches of all breeds and body weight

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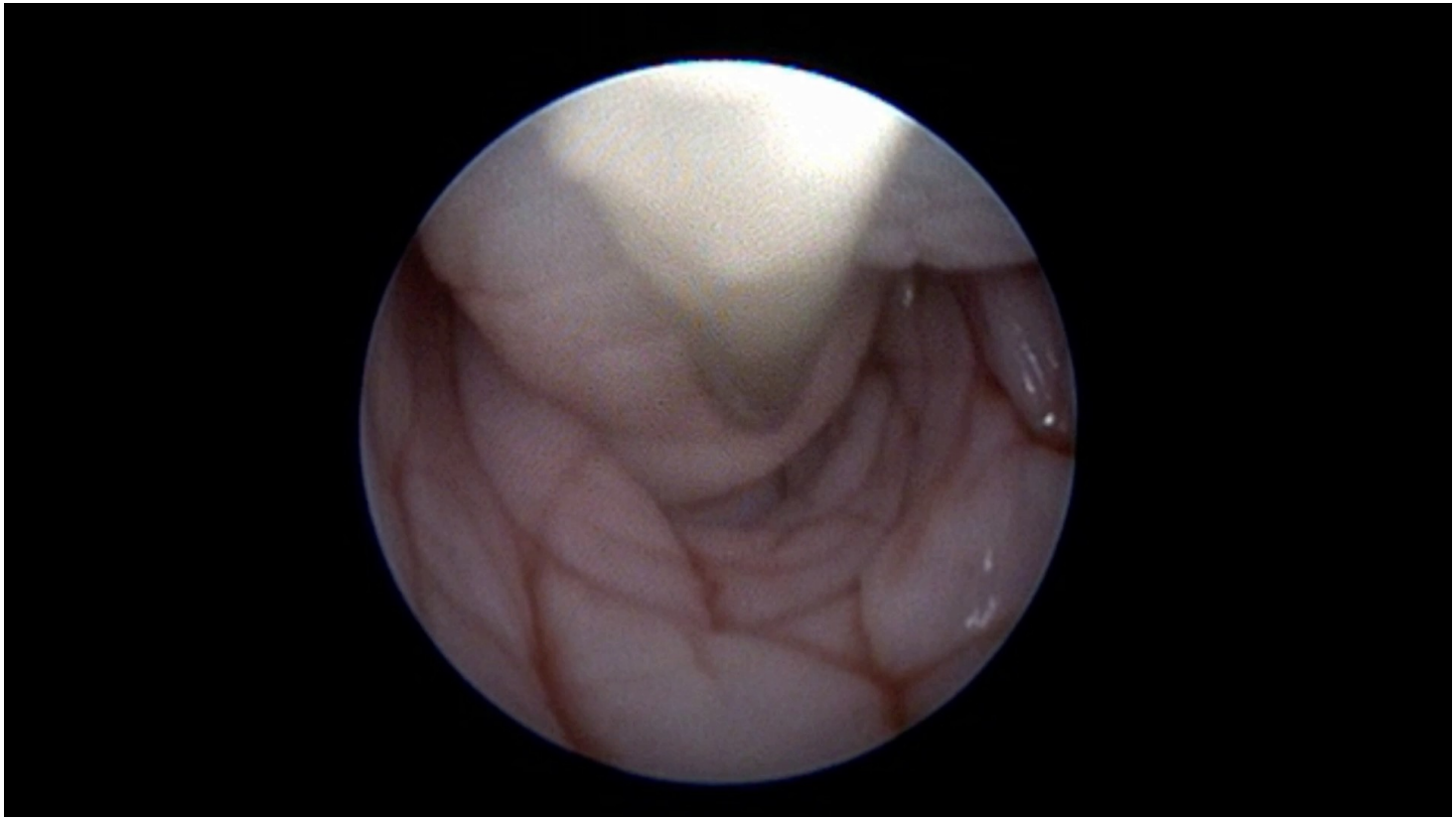
VIDEO OF TCI PROCEDURE – ENDOSCOPIC VIEW



HOW DO YOU BECOME PROFICIENT AT TCI?

The key is practice in order to become proficient

1. **ANATOMY**
2. **EQUIPMENT**
3. **TECHNIQUE**
4. **PROBLEM SOLVING**

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EQUIPMENT:

BASIC REQUIREMENTS FOR TCI

- Rigid endoscope (minimum working length 29cm)
- Air sufflation- rectal insufflation bulb +/- shunt system
- Cold light source: xeon or LED
- Camera
- Cable
- Monitor
- TCI catheters

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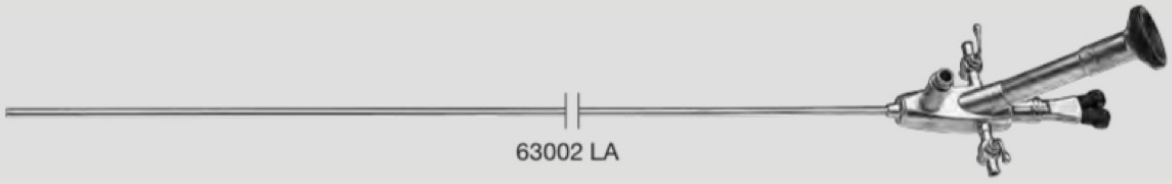

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TCI SHUNT

Three different sized shunts

Very helpful piece of equipment when learning TCI:

- The balloon holds air in the vagina: maintains a lumen to follow to the cervix (care with over-insufflation)
- Facilitates introduction of the scope to the reproductive tract and prevents the scope being directed into the clitoral fossa and urethral opening

CLEANING:

SCOPE AND CATHETERS

Disinfection Products: CIDEX® (3.4% alkaline glutaldehyde)

7X® (MP; diluted 2.5% v/v)

Cleaning Brush

Gold Standard: Gas Sterilization (Ethylene oxide)

Autoclave: reduces the life of scope

RESTRAINT AND SET UP FOR BEST PERFORMING TCI

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- Stand with an opening front door (optional)
- Belly band (optional) and collar retraint
- Hydraulic table
- Hydraulic chair

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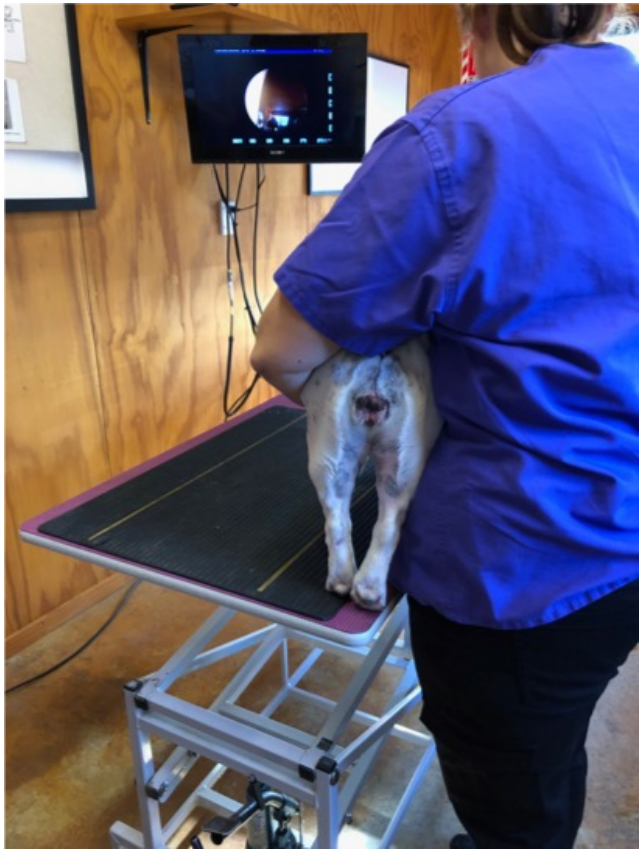
MINIMAL RESTRAINT REQUIRED



Rugby ball hold for small breeds

Bitches are happy to stand when they are in ‘standing’ heat

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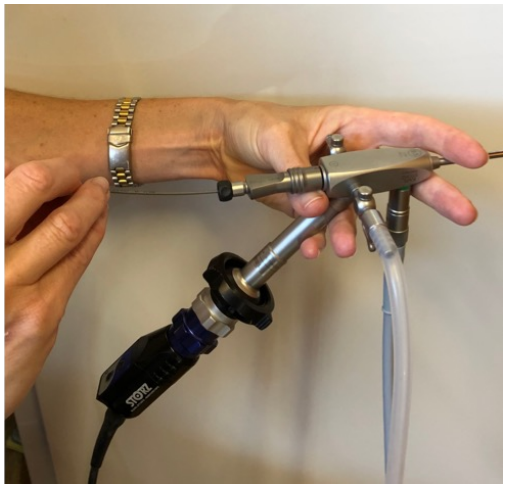
HOW TO HOLD THE TCI ENDOSCOPE

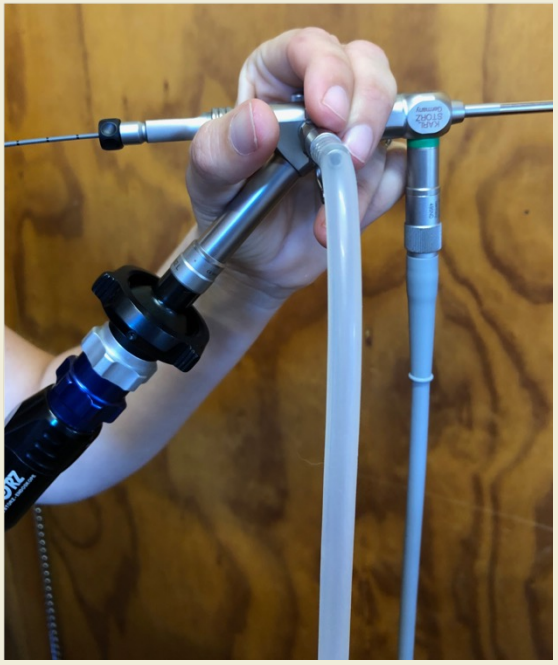


Scope should be balanced comfortably in either your left or right hand and the other hand controlling the catheter and air sufflation.

IMPORTANT: both hands must work together

HOW NOT TO HOLD THE TCI ENDOSCOPE

Don’t hold the scope by the camera head or shaft



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An unbalanced scope gripped tightly will not facilitate the movements required for manipulation of the cervix and catheterization

TCI TECHNIQUE

ANATOMICAL OBSTACLES STEP BY STEP:

1. Entry through the vulval lips
2. Up, in and over the pelvic brim (avoiding clitoral fossa and urethra)
3. Through the caudal vaginal folds
4. Under the dorsal median fold (DMF)
5. Roll under the cervical tubercle (CT)
6. Locate the ventrally facing cervical os
7. Catheterize the cervical canal

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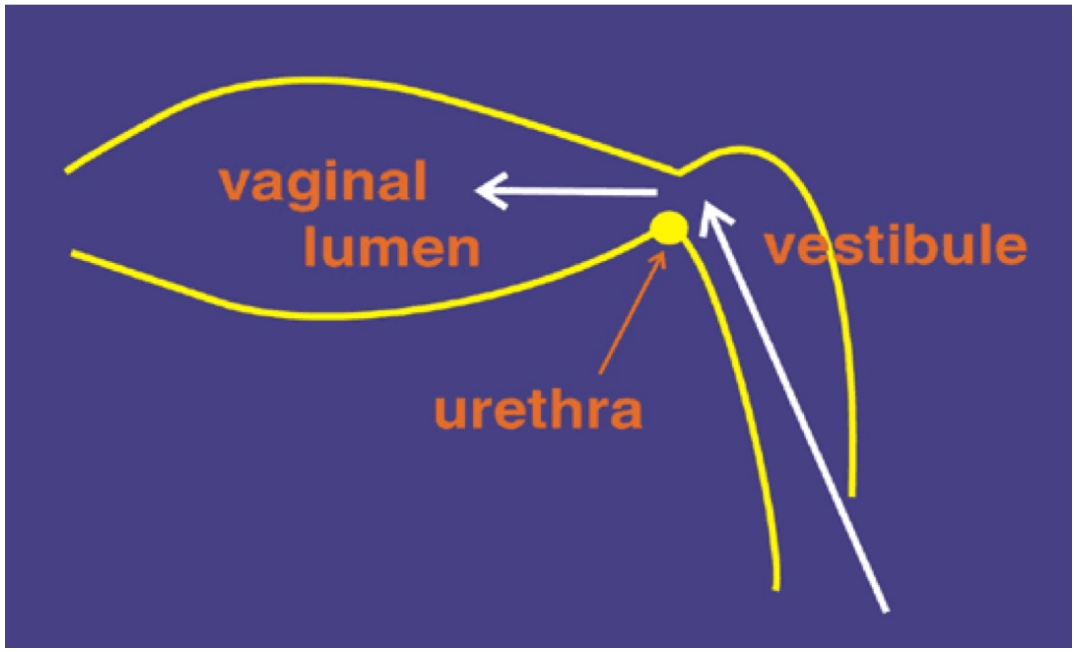
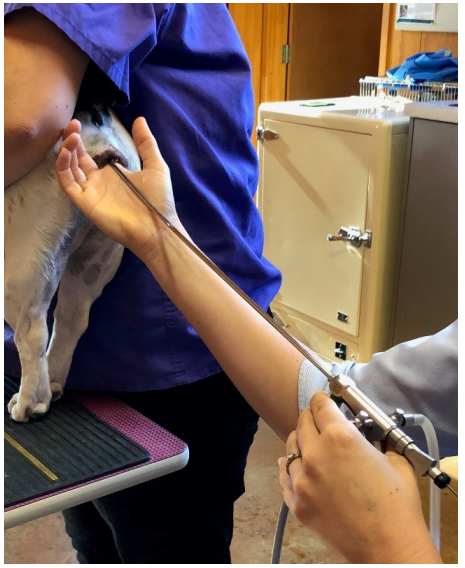
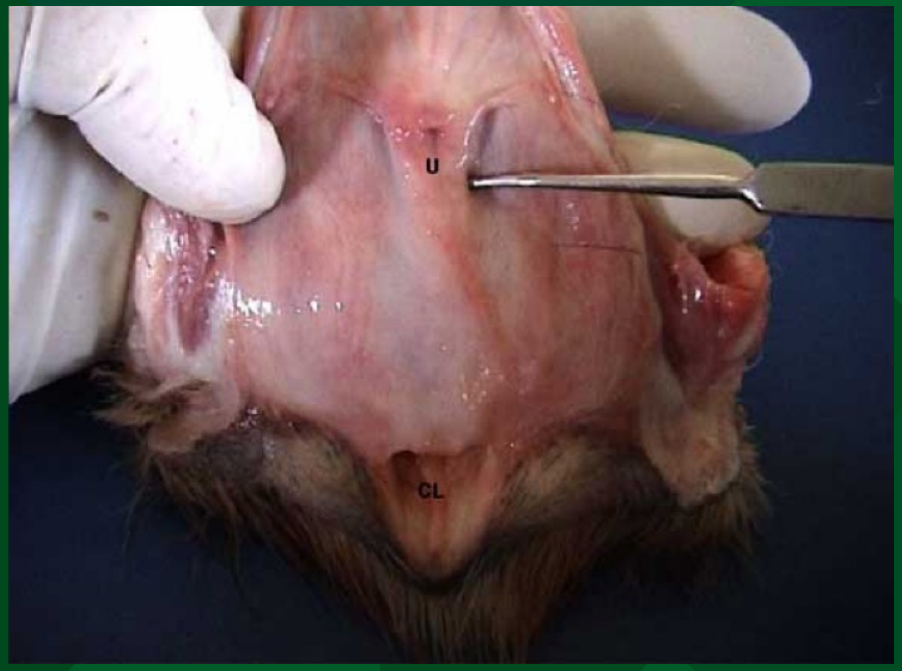
TCI TECHNIQUE: ENTRY ANGLE



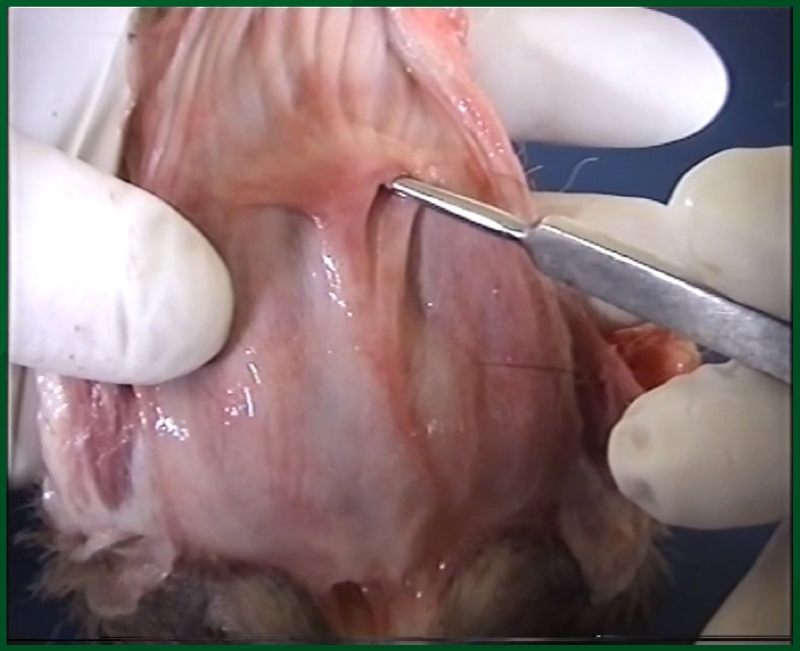


Hold endoscope down so as to enter the vulva at a 60-80^{o} angle

ANATOMICAL LANDMARKS TO AVOID



Clitoral fossa just inside the vulva -> pain!



Urethral opening -> bladder

Solution: TCI Shunt or gloved guided finger to guide scope into the reproductive tract

ONCE OVER PELVIC BRIM – RAISE ENDOSCOPE HORIZONTALLY

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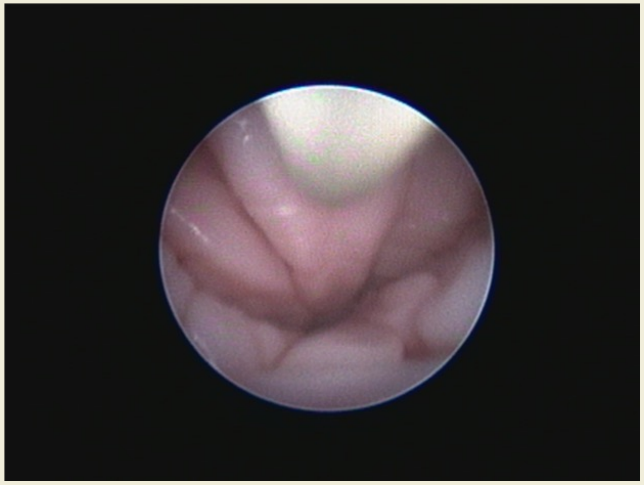
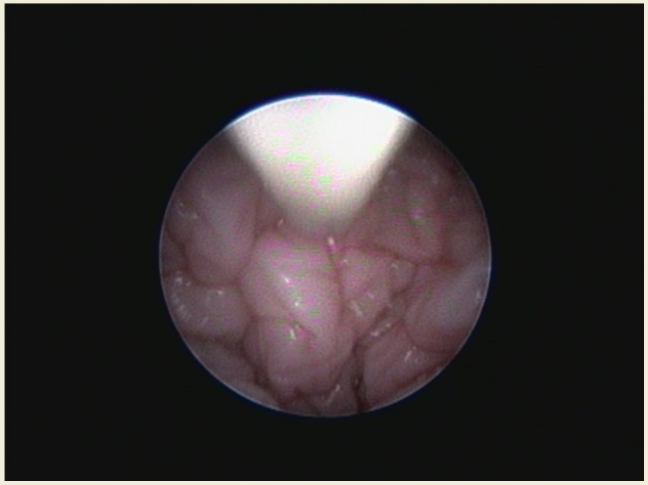
CAUDAL VAGINA:

VARIES IN APPEARANCE DEPENDING ON STAGE OF CYCLE

- Once over pelvic brim guide scope into a horizontal position, use air sufflation and visualize the folds of the caudal vaginal lumen



LH 2 : Early



LH 5: Time of AI

LH 7: late

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Early

Increased vaginal mucosal paleness, crenulation and lumen size

Caudal vagina to dorsal median fold

FOLLOW THE VAGINAL LUMEN:

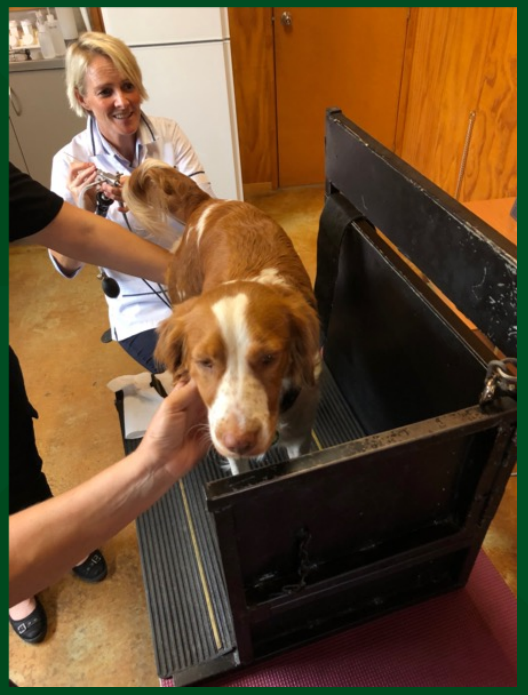
USE AIR TO CREATE A LUMEN AND USE THE TIP OF THE CATHETER TO 'FOLLOW THE VAGINAL LUMEN': IT WILL LEAD YOU TO THE CERVIX!

DIRECTION OF THE VAGINA CAN VARY GREATLY

Endoscope held in horizontal plane to pass through vagina in a straight cranial direction in most bitches

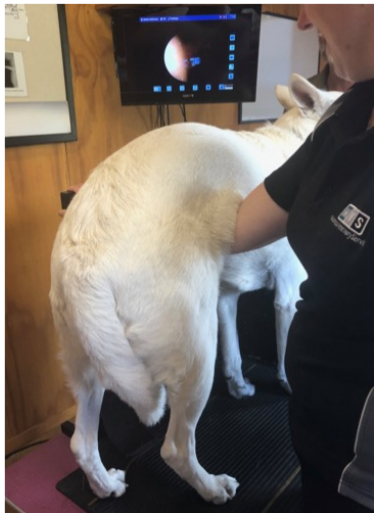
BUT

Bulldogs/ breeds with a tipped pelvis - arms/elbows elevated and drive downwards to follow the lumen!



Not standing square - bent

OTHER IMPEDIMENTS TO FOLLOWING THE VAGINAL LUMEN



- Excessive bloody discharge
- Mucky discharge (late AI)
- Excessive restraint
- Full bladder +/or full rectum

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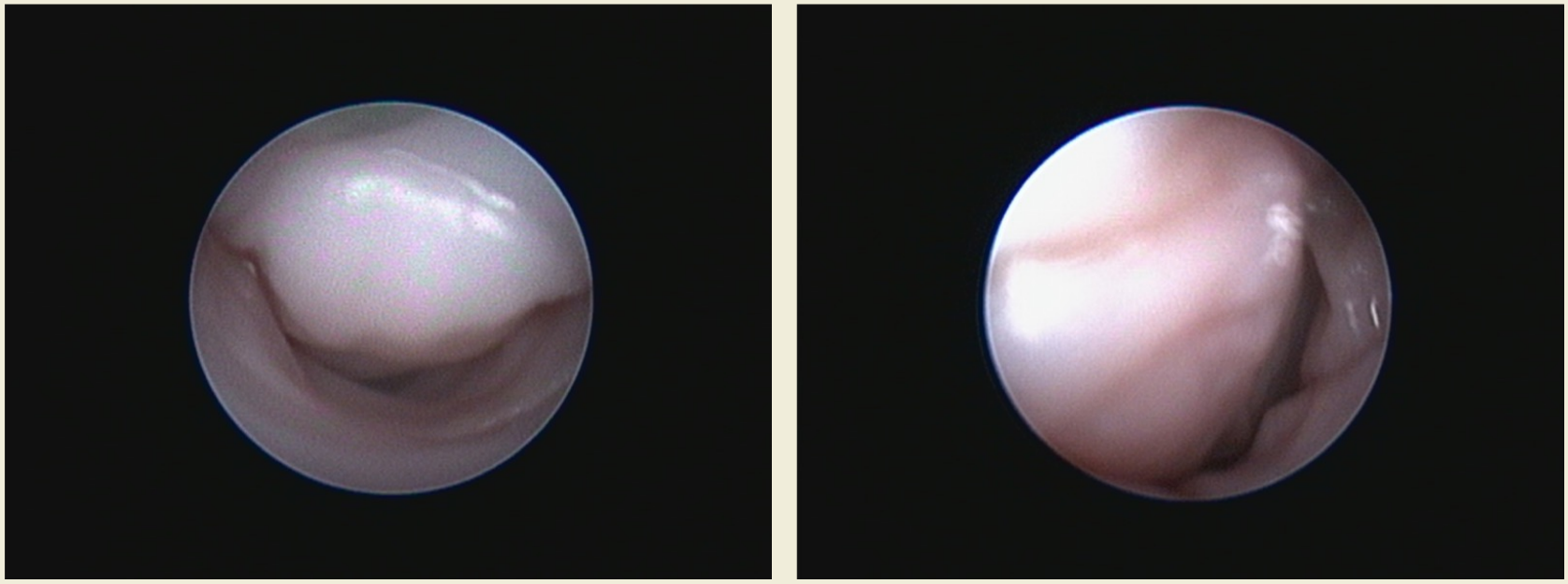
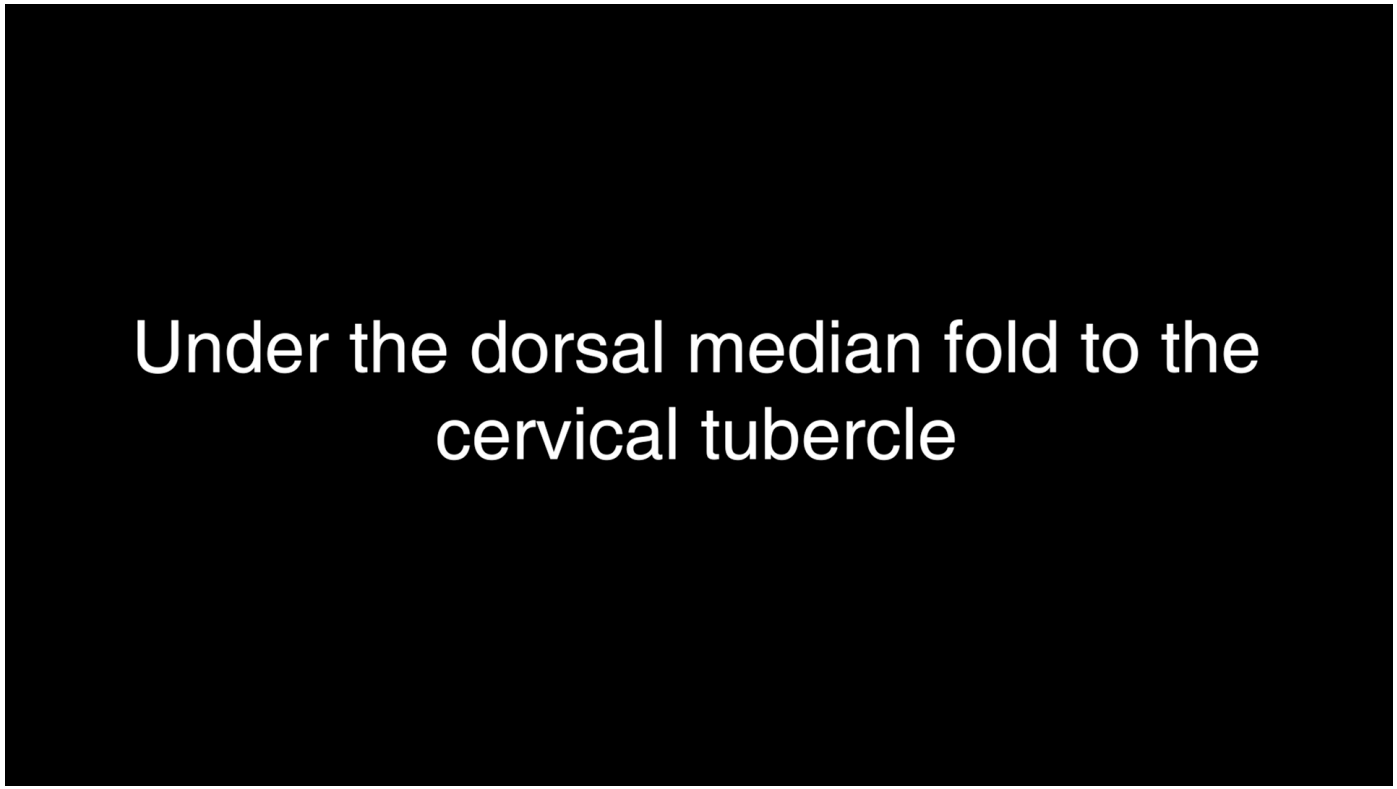
ENDOSCOPIC VIEWS OF THE (NARROW) PARACERVICAL AREA



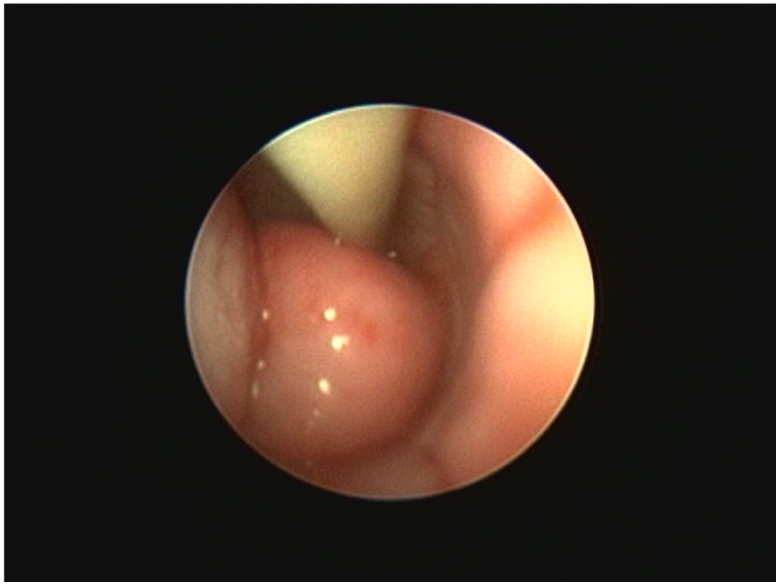
NOTE THE CRESCENT SHAPED AND NARROWED LUMEN CREATED IN THE CRANIAL VAGINA BY THE DORSAL MEDIAN FOLD (DMF)

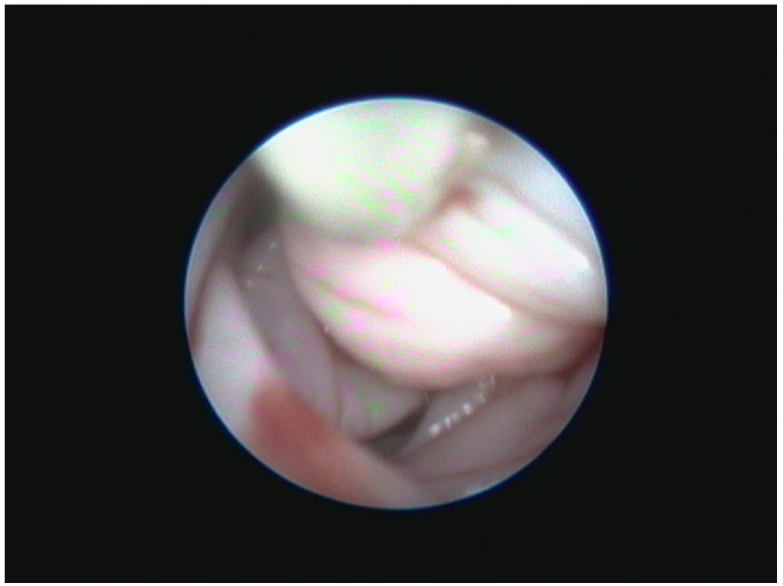


In most bitches, get under the DMF by passing on one of the sides as that is where there is greatest space and therefore more tolerated

REMEMBER TO FOLLOW THE LUMEN:

USE AIR TO CREATE A LUMEN UNDER THE DMF AND THE TIP OF THE CATHETER TO GUIDE YOU TO THE CERVIX





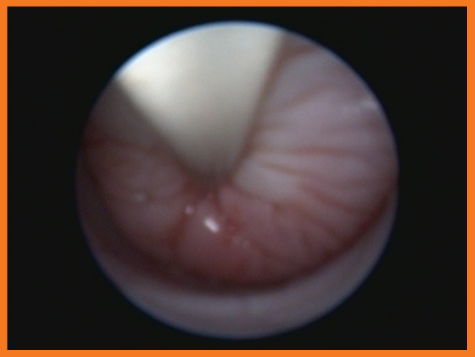
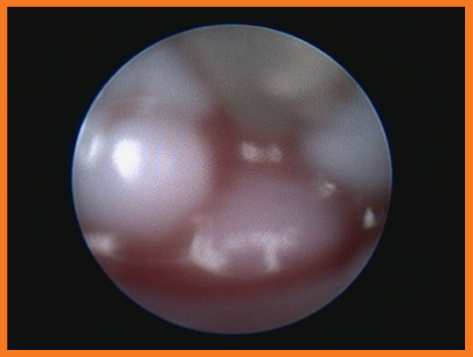
IDENTIFY THE CERVICAL TUBERCLE

Hangs from the roof of the cranial vagina in the fornix= mobile

FIND THE OPENING OF THE CERVIX: HOW TO IDENTIFY IT?



Folds or rosettes the cervical os is in the center

Discharge can help find the os

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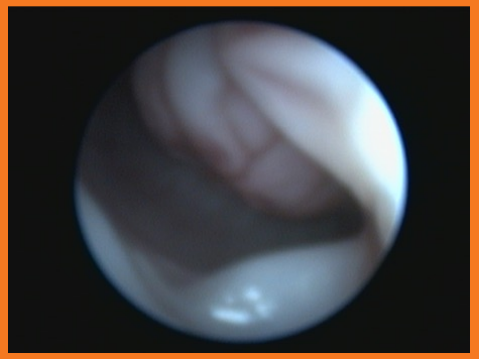
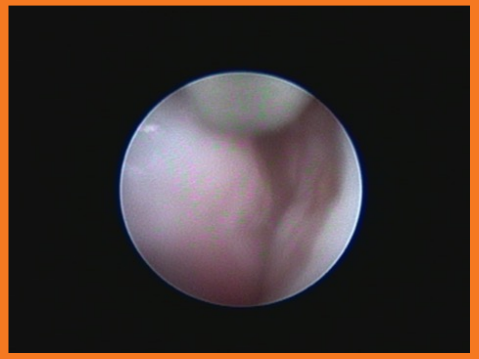
IDENTIFY THE CERVICAL OPENING

Common position: Central and ventral/downward facing

CERVICAL TUBERCLE IS MOBILE= THE LOCATION OF THE OPENING/OS CAN BE VARIABLE!

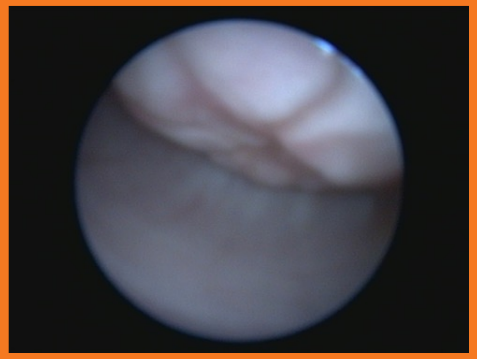


Cranio-ventral facing

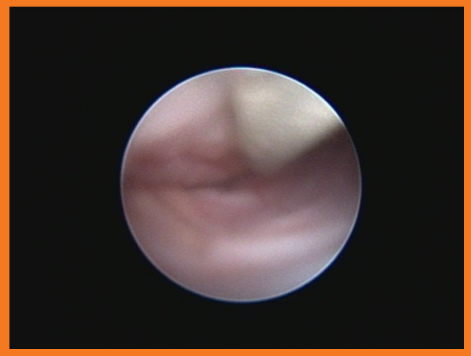


Facing the side wall of the fornix

Facing the side wall but note: rosette folds – lead to os



Ventrally facing



Ventrally facing

Cranial position of os within the furrows

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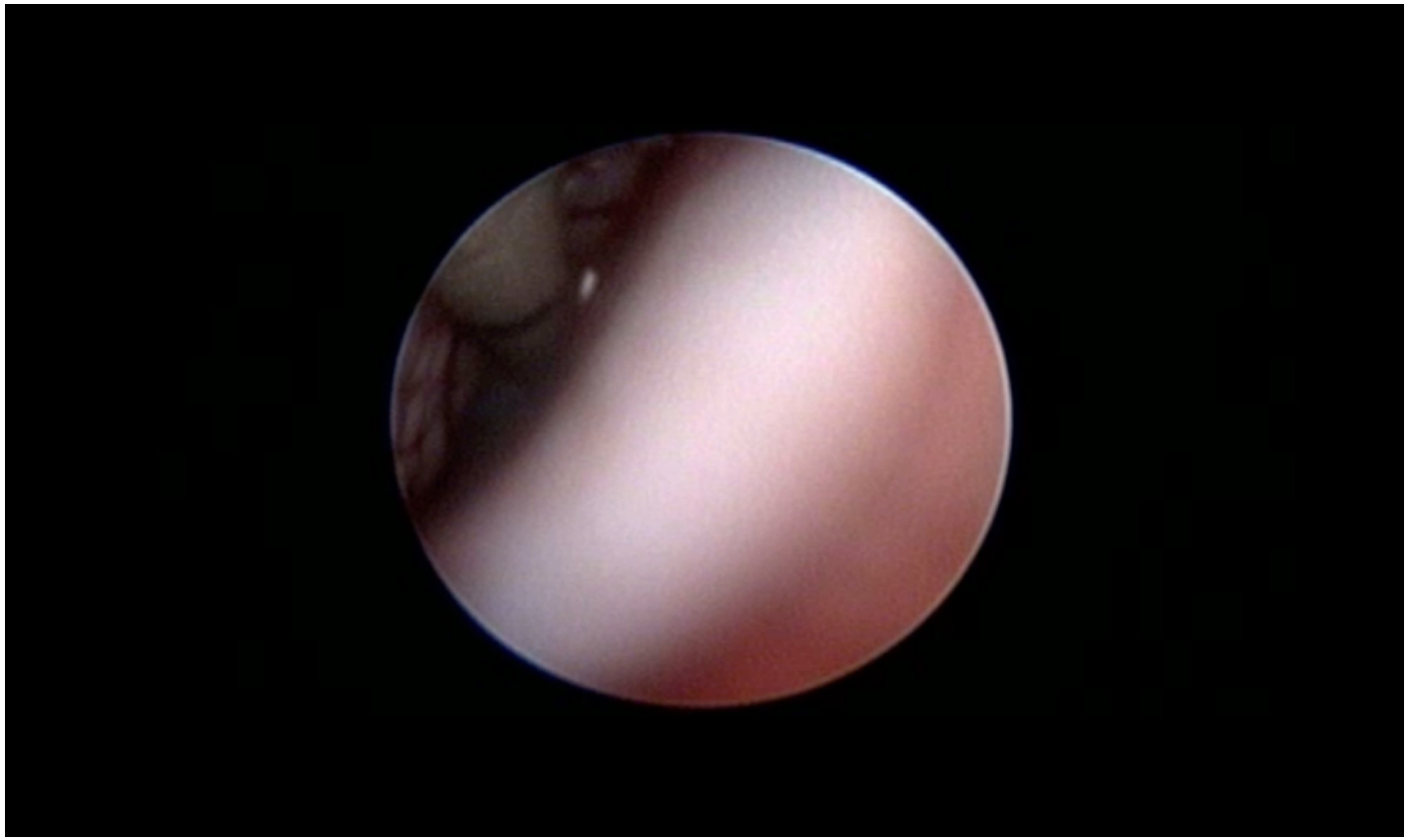
CERVICAL OS POSITIONED AGAINST THE LATERAL VAGINAL WALL



FINDING AND CATHETERIZING THE CERVICAL OPENING

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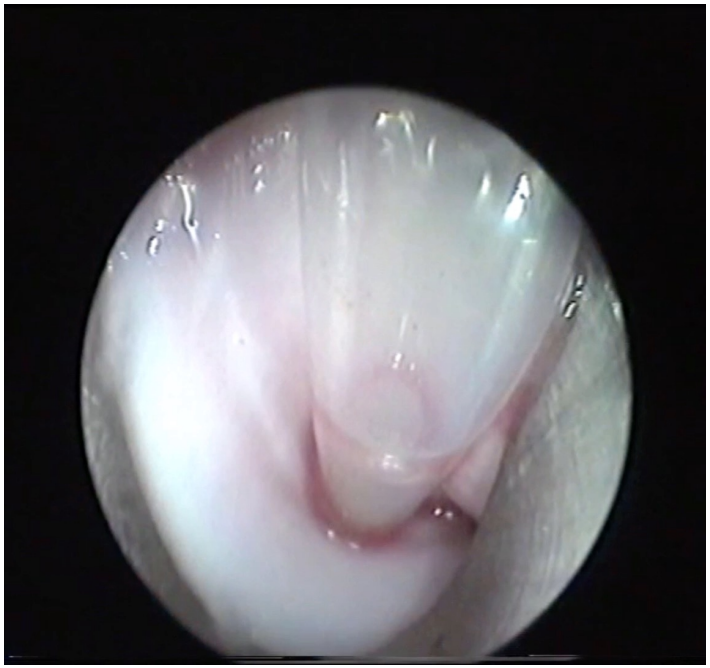
Two main Aims:

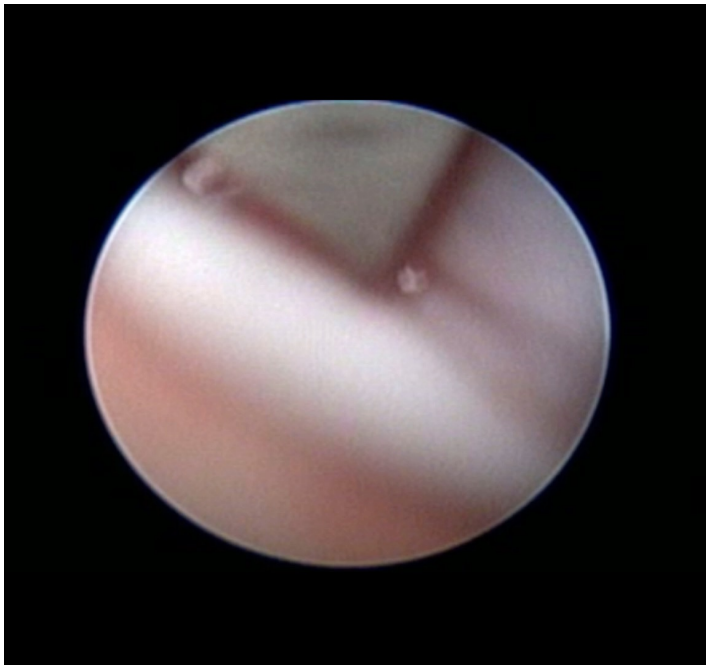
1. Find the opening by rolling ventrally underneath the cervical tubercle and lifting the opening up to be lined up directly in front of the scope

2. Angle of approach: the angle of the scope and therefore catheter have to be in line with the angle of the cervical canal

ARMS UP TO ROLL UNDER THE CERVIX TO LOCATE THE OPENING

TIP: ELEVATE THE VULVA AT THE DORSAL COMMISSURE TO FACILITATE GETTING A GREATER ANGLE WITH THE ENDOSCOPE IN ORDER TO ROLL UNDER THE CT IN SOME BREEDS.

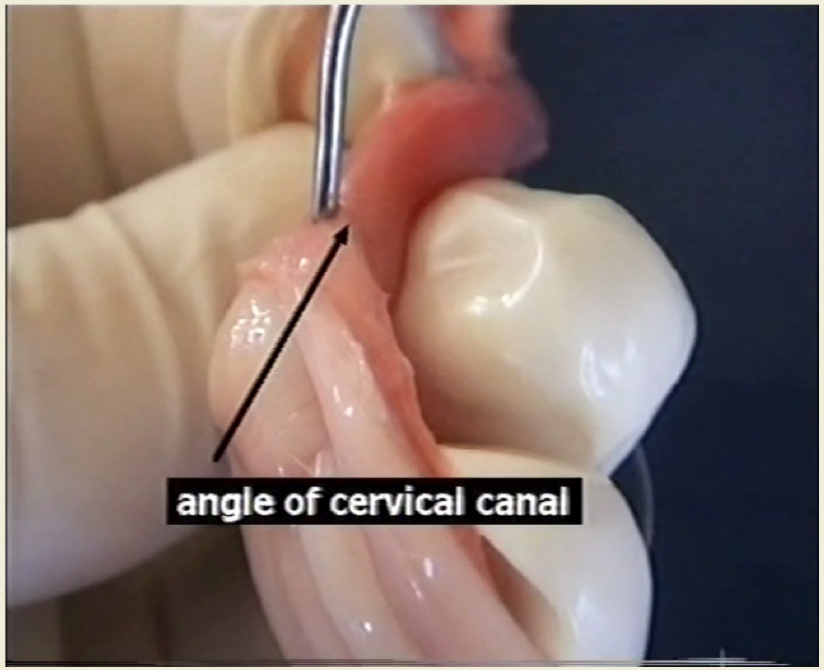




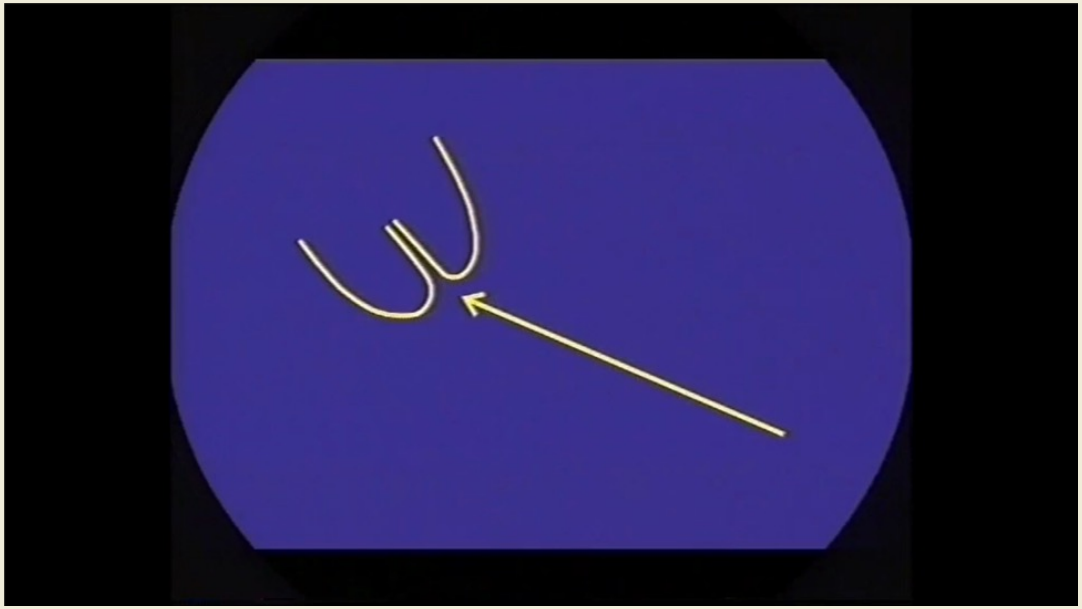
ROLL UNDER THE CERVICAL TUBERCLE TO LOCATE THE OPENING

SUCCESSFUL CATHETERIZATION:

IT'S ALL ABOUT GETTING THE ANGLE RIGHT



Dorso-cranial angle of the cervix



Problem to overcome: Conflicting angle of the cervical canal and the endoscope and catheter

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CATHETERISATION TECHNIQUE

To obtain the correct angle for catheterization of the cervical canal:

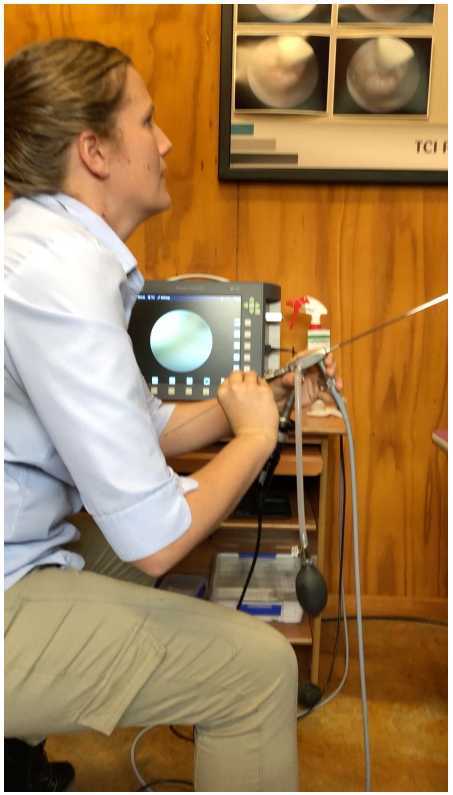
i) Drop the endoscope downwards

ii) Use the catheter, endoscope position and air to manipulate CT to line up in front of the opening

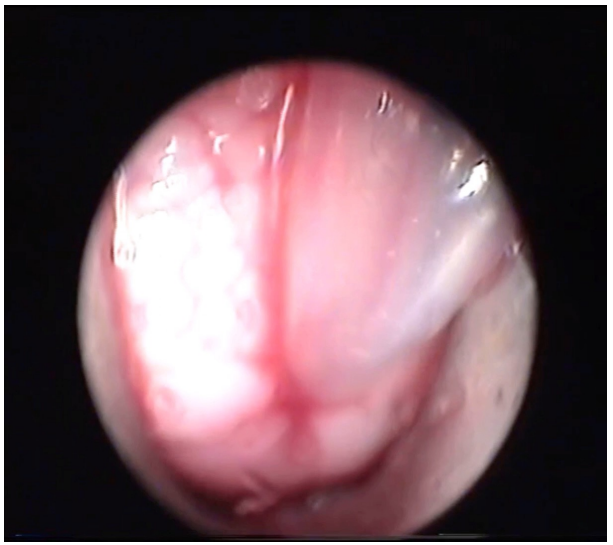
iii) Then hold the CT in position (pinning) to pass the catheter up the cervical canal into the uterus

Dropping the endoscope down facilitates visualization and manipulation of the ventrally facing cervical opening into position for catheterization

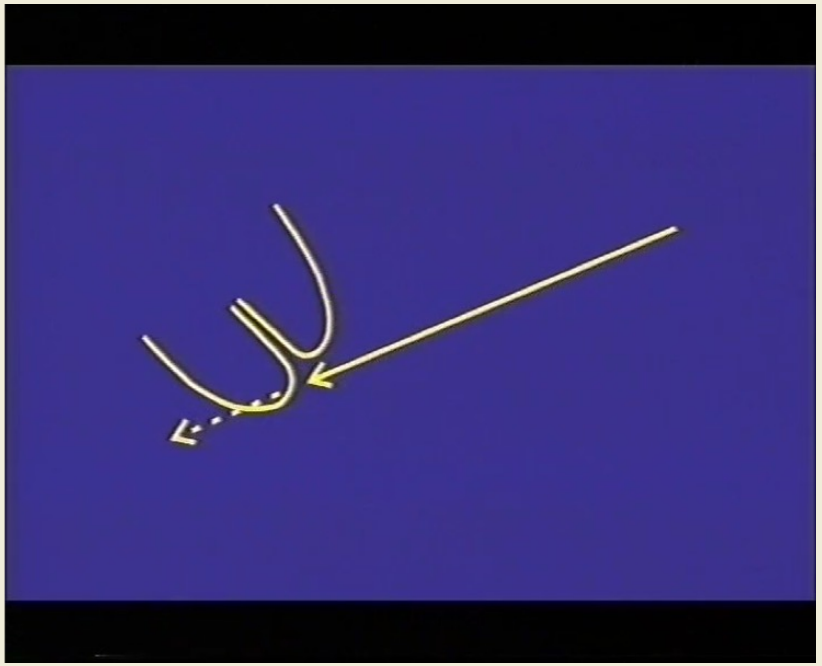
iv)**Twirling** of the catheter can help with manipulation of the CT into position and the passage of the catheter up the cervical canal

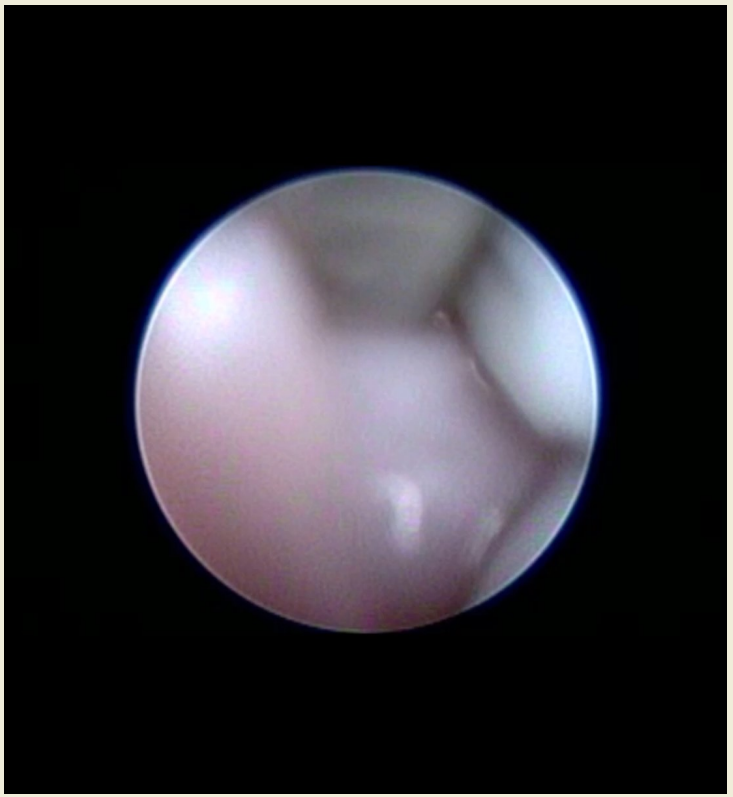


Twirling and driving the catheter into the cervical canal with the scope in a downwards position facilitates its position well into the uterus for insemination

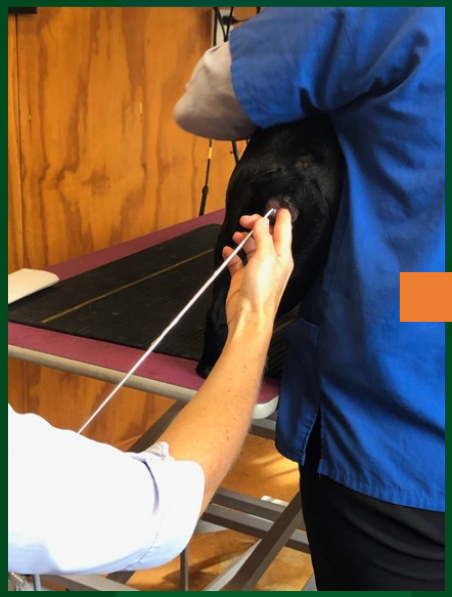


IF YOU GO STRAIGHT AT THE CERVICAL OPENING THE CERVICAL TUBERCLE WILL BE PUSHED AWAY AND THE CATHETER WILL SLIP TO THE FLOOR OF THE VAGINA/FORNIX





SUMMARY OF ENDOSCOPE AND ARM POSITIONS



Start with endoscope **DOWN** to enter between the parted vulval lips and into the vestibule

Then move endoscope to **HORIZONTAL** plane once over the pelvic brim to pass through the caudal vagina

Arms **UP** to roll under CT to find the ventrally located os

Drop endoscope **DOWN** to catheterize the os and run the catheter up the cervical canal

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TCI INSEMINATION: TECHNIQUE

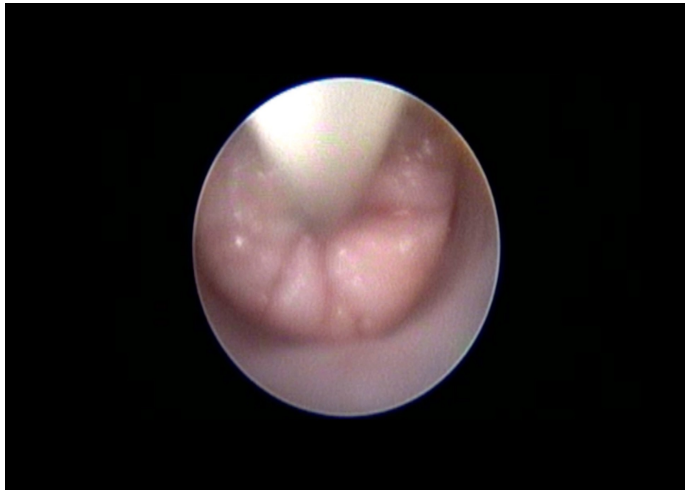
- Volume of inseminate
    - BW, breed and parity dependent
    - Most common volume used : 2-3 mls
    - Potential advantage of larger volumes?
- Inject slowly and stop intermittently
- Use markings on TCI catheter to know location in uterine horn
- Make sure pass up cervical canal into uterine horn (advance catheter 2-5cm into horn depending on bitch size)

INSEMINATION

Endoscopic view

Outside view: slowly inject over a few minutes

BACK FLOW DURING INSEMINATION



Important: backflow is common and is NOT associated with a decrease in Pregnancy Rate or Litter Size

Reasons:

1. Poor position of the catheter
2. Volume of the inseminate
3. Position of endoscope
4. Inject inseminate too quickly
5. Inject too much air at the end of insemination
6. Care with non latex/rubber syringes

Solution:

When backflow occurs- pause injection- re-position catheter forward or backwards and start injecting again SLOWLY

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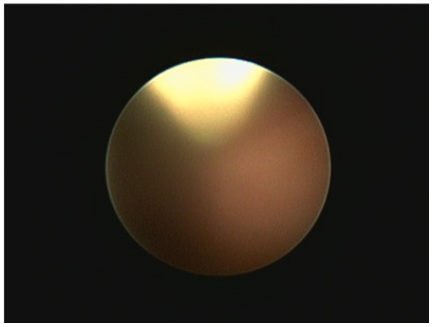
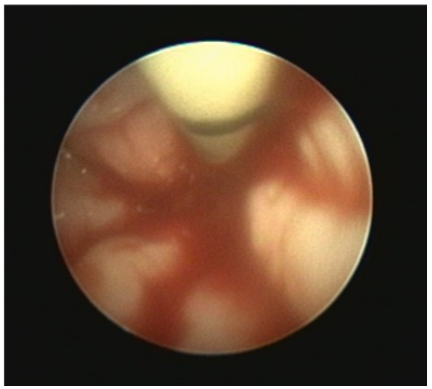
LIMITING FACTORS/ PROBLEMS

- Most TCI's (90%) are straight forward and take less than 5 minutes
- There are some (10%) that require more manipulation of the cervix to get it in the right position for catheterization
- There are the rare ones that cannot be catheterized - apx 1 bitch per 500 (Breed prevalence)

POOR VISIBILITY





1. Fogging
2. Excess bloody fluid and pooling
3. Thick discharge

These problems are usually related to either stage of cycle or certain breeds

Solution *for excessive fluid pooling: Use 5 Fr catheter with stiletto removed and tip cut off and apply suction with 10 ml syringe*

SAFETY

Two important considerations:

1. Trauma

2. Infection- risk of pyometra depends on uterine pathology present (CEH) and the ability of the uterus to be able to clear unwanted debris, bacteria, dead sperm etc before the cervix closes.

THANK YOU!

- DR MARION WILSON FOR HER INPUT, ADVICE, GUIDANCE AND MENTORSHIP
- STAFF AT NZ GUIDE DOGS, NZ POLICE DOG AND MPI DETECTOR DOG BREEDING CENTER
- GLENBRED TEAM IN NZ
- CSU SMALL ANIMAL REPRODUCTION TEAM AND CLIENTS