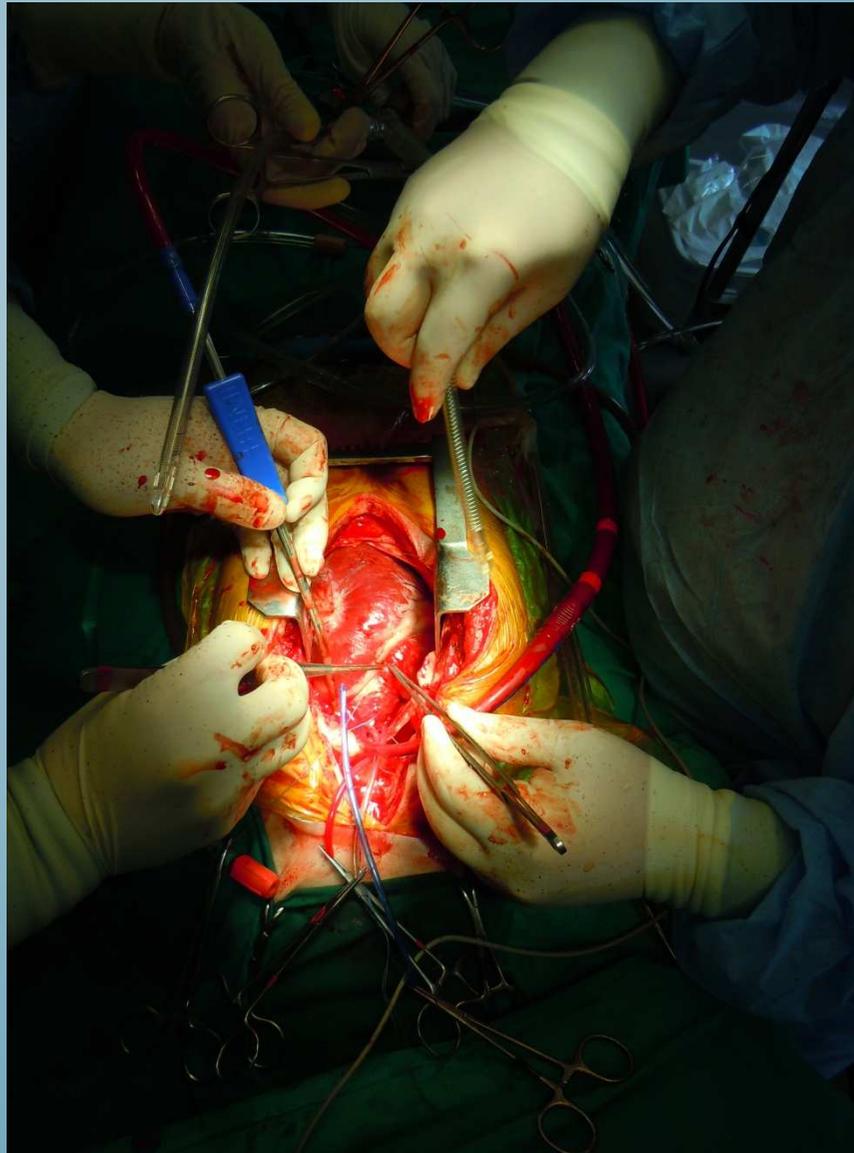


# **CURRENT CARDIAC SURGERY IN SOUTH AFRICA**

*Dr R C Elliott BVSc MMedVet Surgery  
Bryanston Veterinary Hospital*

**ALL  
HANDS ON  
DECK**



**SURGICAL  
TREATMENT  
OF HEART  
DISEASE**

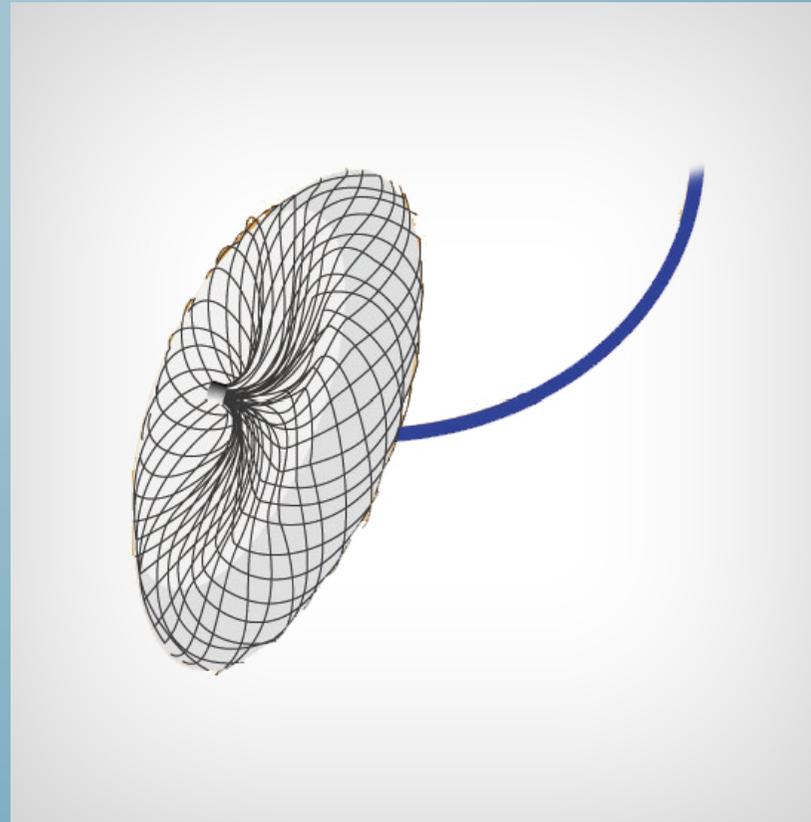
- *Non-invasive cardiac intervention / percutaneous*
- *Beating heart surgery*
- *In-flow occlusion*
- *Cardiac bypass*

## **NON-INVASIVE CARDIAC INTERVENTION**

- *Bi-planar fluoroscopy ideal*
- *Minimally invasive*
- *Can treat a wide range of congenital defects*
- *Pulmonic stenosis, aortic stenosis, most ASD's except primum ASD's - these will always require bypass*

**NON-INVASIVE  
CARDIAC  
INTERVENTION**

**ASD OCCLUDER  
DEVICE –  
INFINITI  
MEDICAL**



## **NON-INVASIVE CARDIAC INTERVENTION**

- *Pulmonic stenosis*
- *Prognosis depends on the magnitude of obstruction and the degree of right ventricular hypertrophy*
- *A systolic pressure gradient over 75 mm Hg increases risk of sudden death and development of right heart failure*
- *Balloon dilatation has been widely used in dogs and humans with good results and remains the first choice in treatment of the defect*
- *Severe cases often require open heart procedures to correct*

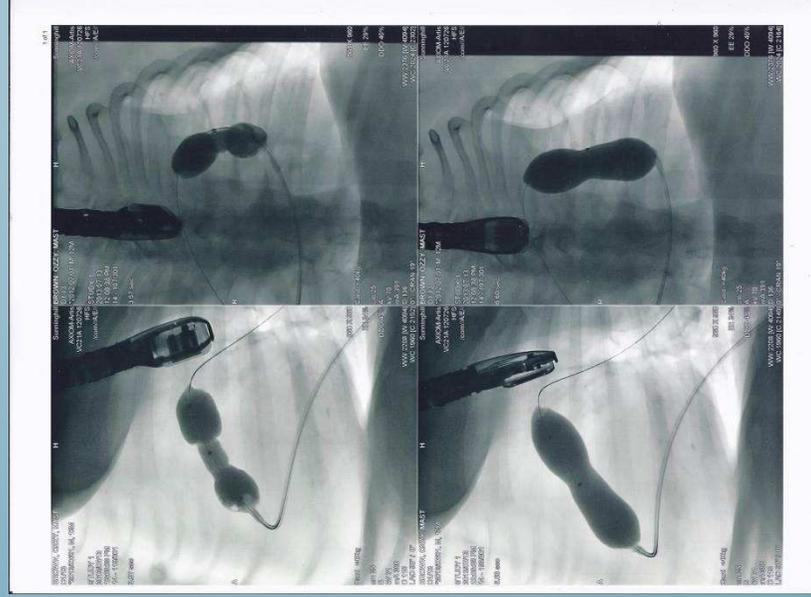
## **NON-INVASIVE CARDIAC INTERVENTION**

- *Pulmonic stenosis – Case 1*
- *Male Bulldog 10 months old*
- *Marked exercise intolerance*
- *Marked ascites*
- *Aberrant coronary on CT angiogram*
- *Marked stenosis PA diameter 12mm  
valvular diameter 4mm*
- *Pressure gradient 125 mm Hg*

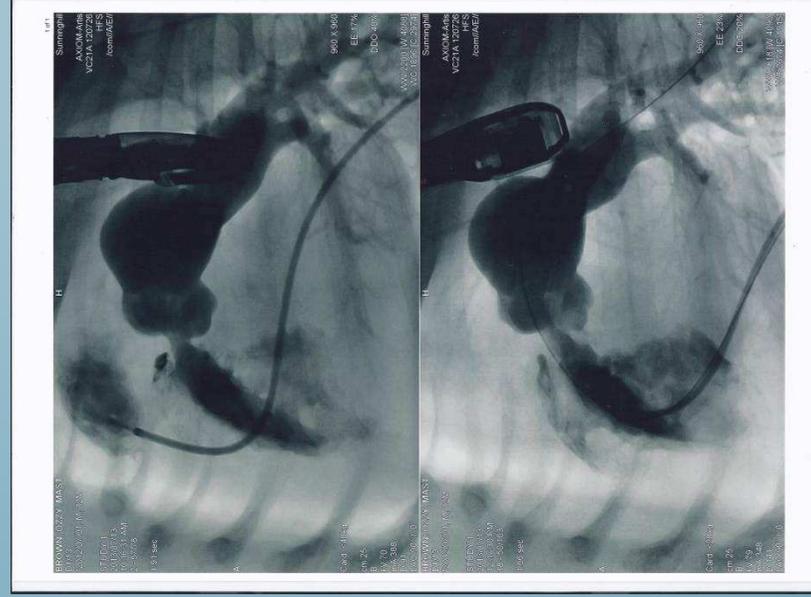
## **NON-INVASIVE CARDIAC INTERVENTION**

- *Dilated with a 12mm nucleus balloon*
- *Dilated to 10mm*
- *Post pressure gradient 75 mm Hg*
- *Ascites resolved*
- *Exercise tolerance was increased*
- *Advised owner will need further surgery under bypass*
- *Owner declined*

# NON-INVASIVE CARDIAC INTERVENTION



# NON-INVASIVE CARDIAC INTERVENTION



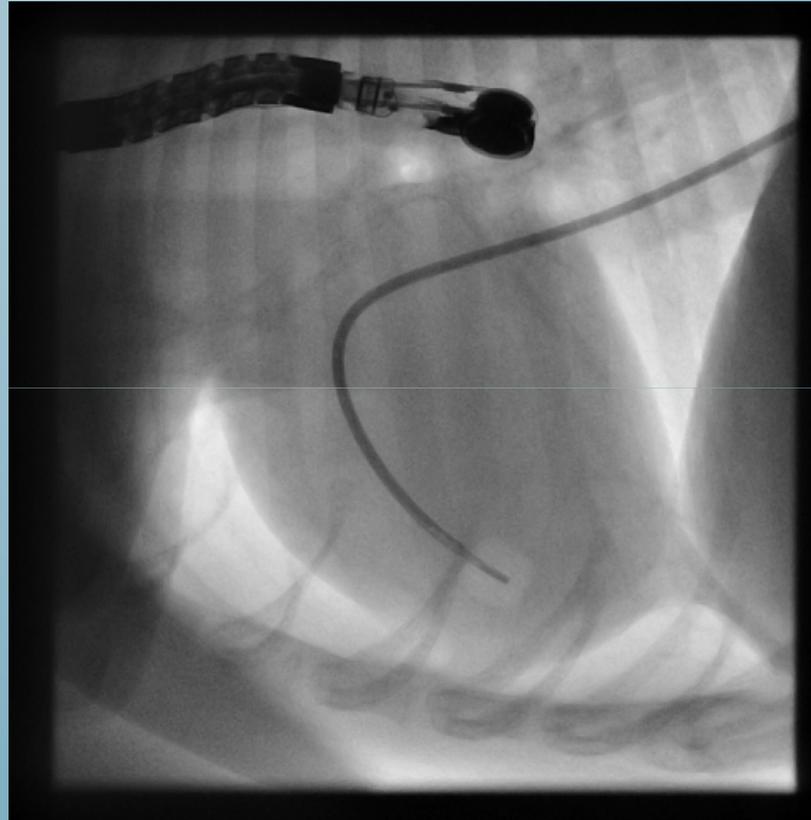
**NON-INVASIVE  
CARDIAC  
INTERVENTION**

- *Pulmonic stenosis – Case 2*
- *8 month old Schnauzer*
- *No clinical signs*
- *PA diameter 10mm*
- *Valvular diameter 5mm*
- *Pressure gradient 75 mm Hg*

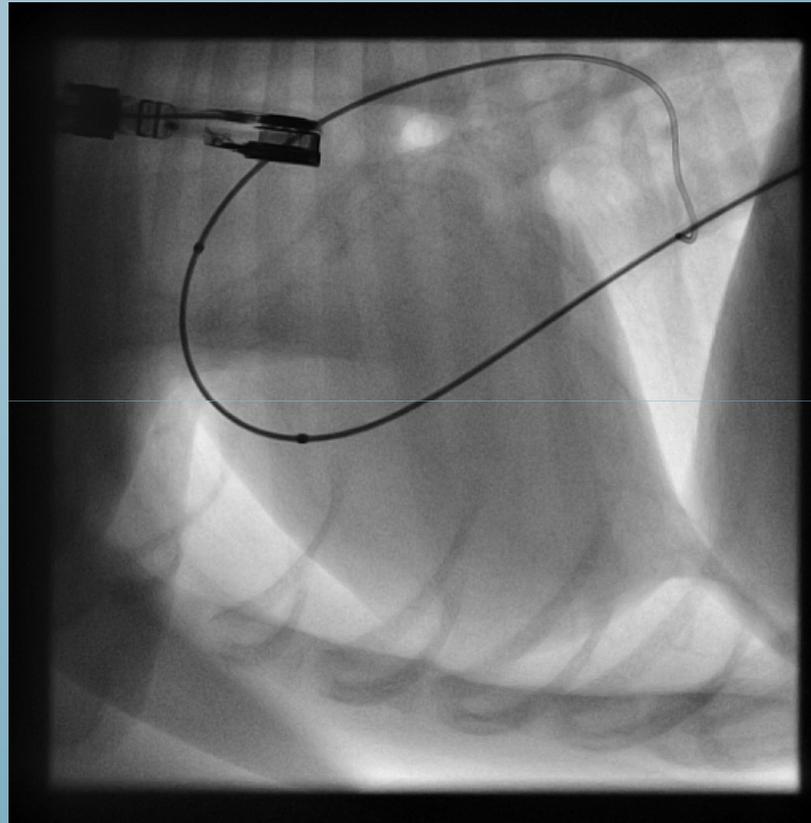
## **NON-INVASIVE CARDIAC INTERVENTION**

- *Dilated with a 10mm standard balloon*
- *Post pressure gradient 29 mm Hg with a plateau at 9 mm Hg*
- *Owners report he is doing really well 2 months post procedure*

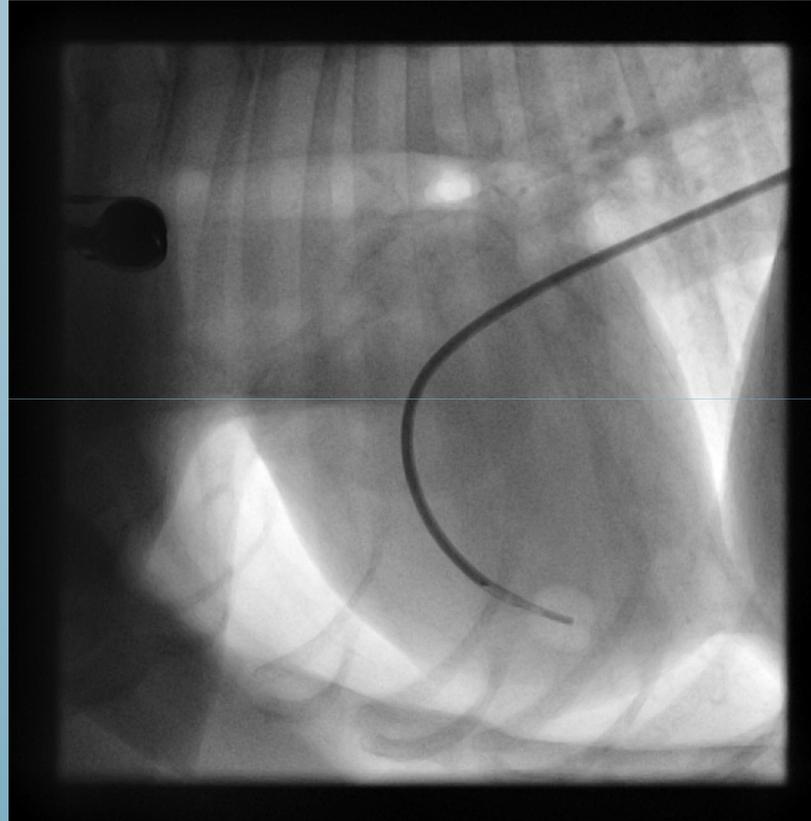
**NON-INVASIVE  
CARDIAC  
INTERVENTION**



**NON-INVASIVE  
CARDIAC  
INTERVENTION**



**NON-INVASIVE  
CARDIAC  
INTERVENTION**



## **NON-INVASIVE CARDIAC INTERVENTION**

- *Aortic stenosis using a cutting balloon and high pressure valvuloplasty*
- *PDA occlusion using a specifically designed coil*
- *Valve replacement is currently being done through the femoral vein in humans*

## **BEATING HEART SURGERY**

- *Surgery performed without arrest of the heart*
- *PDA ligation, pericardectomy, pulmonary artery banding and removal of masses on the right auricle*
- *Small complication rate but complications are catastrophic*
- *Movement of the heart adds to the difficulty and limitation of the surgical procedures being performed*

## **BEATING HEART SURGERY**

- *PDA and pericardectomy are well described and known in veterinary science*
- *Pulmonary artery banding is a palliative treatment of VSD*
- *The goal is to increase the right ventricular pressure to decrease the pressure gradient across the defect*
- *This decreases the shunt flow*
- *If permanent correction at a later stage is considered, then bypass is essential to repair the pulmonary artery and repair the defect*

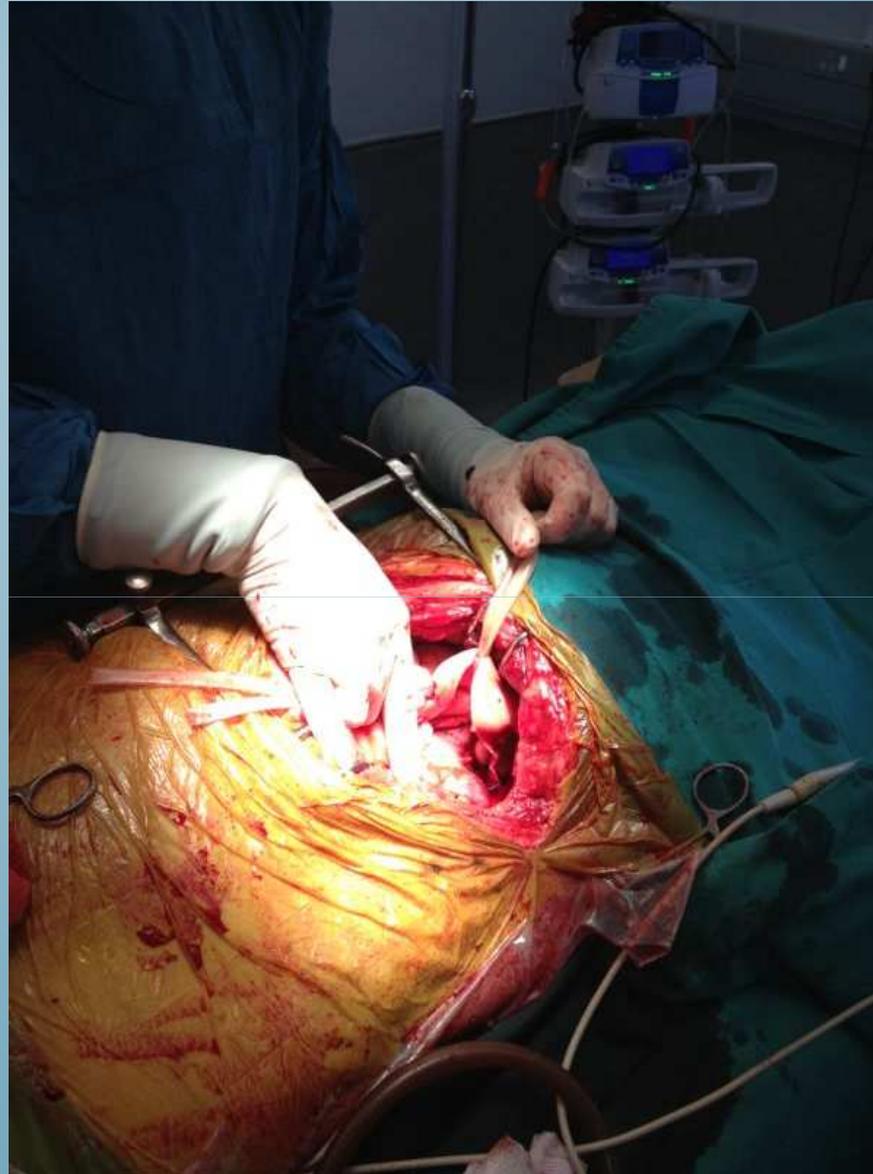
## **BEATING HEART SURGERY**

- *Valve dilatations can be performed through portals in the heart controlled by snares*
- *Ideally one should pre-place tourniquets around the cranial, caudal vena cava and azygous vein as a fall back strategy*
- *This allows inflow occlusion to be rapidly instituted in the event of a catastrophic bleed*

## **IN-FLOW OCCLUSION**

- *This allows time for brief cardiac repair*
- *It entails placement of tourniquets around cranial vena cava, caudal vena cava and the azygous vein to interrupt venous return to the heart*
- *This should ideally not be longer than 2 minutes but with local hypothermia can be pushed to 4 minutes*
- *It can be repeated if more time is needed, as long as enough time and circulation can be given for recovery of the myocardium*

## **IN-FLOW OCCLUSION**



## **IN-FLOW OCCLUSION**

- *Ventilation should be ceased to prevent back flow of pulmonary blood during inflow occlusion*
- *Small atrial masses, patch graft valvuloplasty are the most commonly described uses of inflow occlusion*
- *All equipment for cardio-pulmonary resuscitation should be on hand and gentle cardiac massage is often needed to produce normal heart contractility once the procedure is complete*

## **IN-FLOW OCCLUSION**

- *Inflow occlusion – Case 3*
- *10yr old Golden Retriever*
- *Marked pericardial effusion that reformed after pericardiocentesis*
- *Right atrial haemangiosarcoma*
- *Perforation of the wall of the right atrium*
- *Removed under inflow occlusion*
- *Doxorubicin chemo given post surgery*
- *Survival time 3 months and 2 days*

# CARDIAC BYPASS

- **The Boy and the Starfish**
- *A man was walking along a deserted beach at sunset. As he walked he could see a young boy in the distance, as he drew nearer he noticed that the boy kept bending down, picking something up and throwing it into the water. Time and again he kept hurling things into the ocean.*
- *As the man approached even closer, he was able to see that the boy was picking up starfish that had been washed up on the beach and, one at a time he was throwing them back into the water.*
- *The man asked the boy what he was doing, the boy replied, "I am throwing these washed up starfish back into the ocean, or else they will die through lack of oxygen. "But", said the man, "You can't possibly save them all, there are thousands on this beach, and this must be happening on hundreds of beaches along the coast. You can't possibly make a difference." The boy looked down, frowning for a moment; then bent down to pick up another starfish, smiling as he threw it back into the sea. He replied,*  
  
***"I made a huge difference to that one!"***
- ~Author Unknown~

## **CARDIAC BYPASS**

- *This involves an extracorporeal system that provides a flow of oxygenated blood to the patient*
- *It gives around 80 minutes of surgical time. Procedures where the heart is under bypass for longer than 80 minutes are reported but have a worse prognosis*
- *It requires a massive team effort between the surgeon, anaesthesiologist, perfusionist and surgical assistant*

# CARDIAC BYPASS



## **CARDIAC BYPASS**

- *Cannulation of the vessels provide a port of entry and exit for the blood to leave the body and to be oxygenated and then return to the body*
- *A vessel is snared with a pledget suture and then a slit for the cannula is made*
- *Prior to the initiation of bypass the patient must undergo heparinisation to a ACT of >500*
- *This is reversed with protamine post bypass (potent hypotensive )*
- *The aorta is then cross clamped and a cardioplegia solution is given into the heart to stop cardiac contractility*

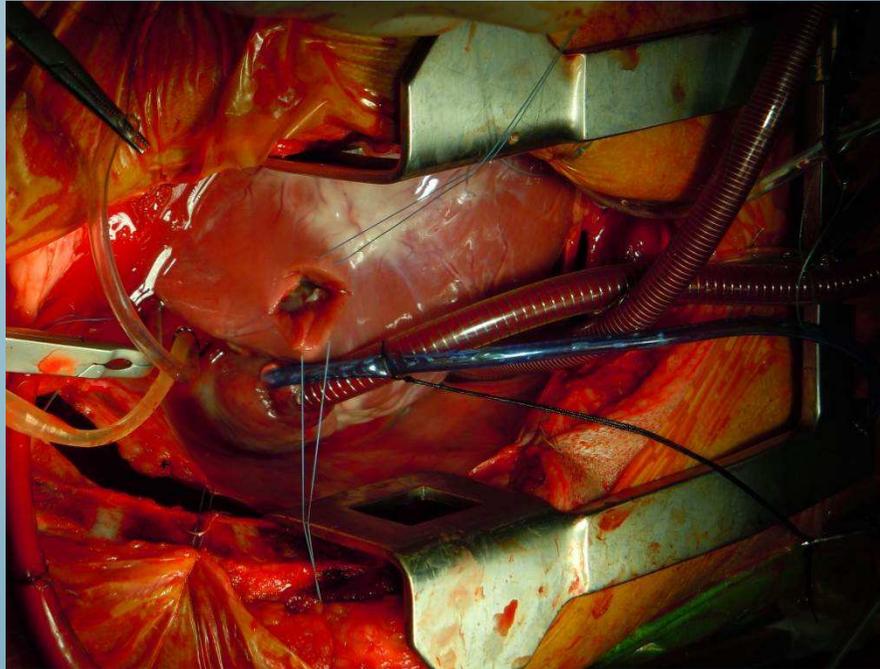
## **CARDIAC BYPASS**

- *Bypass sets in motion a state or systemic shock which needs to be managed*
- *The definition of a successful surgery is turning a disease we cannot treat into one we can kind of treat*
- *Most complications occur within the first 24 hours post bypass*
- *They range from haemorrhage, hypoxia, cardiac arrhythmias, anuria, massive electrolyte and acid base disturbances and death*
- *Most patients should be ventilated for 4-12 hours post bypass*

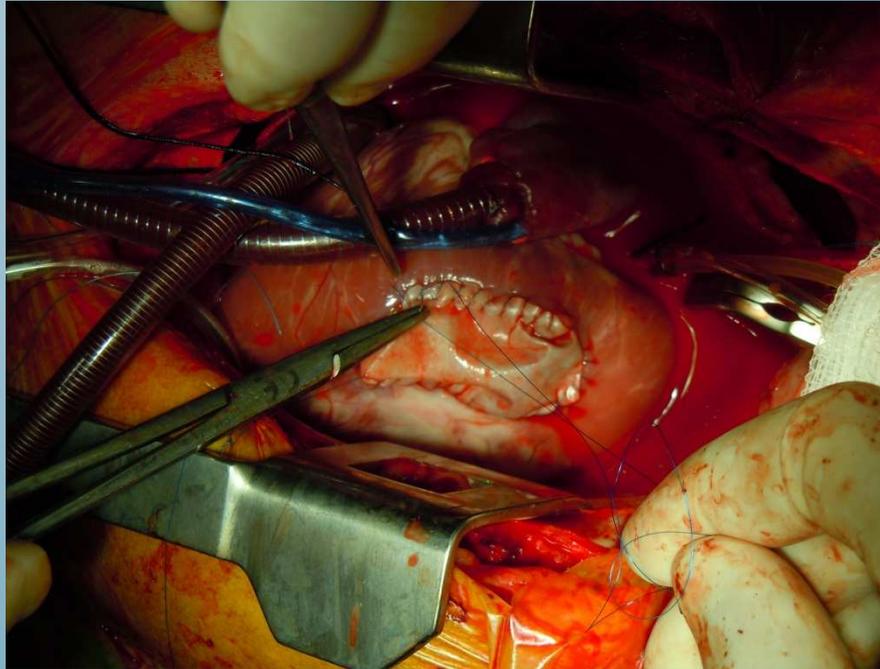
## **CARDIAC BYPASS**

- *Cardiac bypass – Case 4*
- *Double chambered right ventricle*
- *Ventriculotomy performed and fibrous tissue dissected away*
- *Patch graft placed*
- *Excellent result*
- *Dog improved his exercise tolerance and dropped his right out flow pressures*
- *He is doing very well currently*

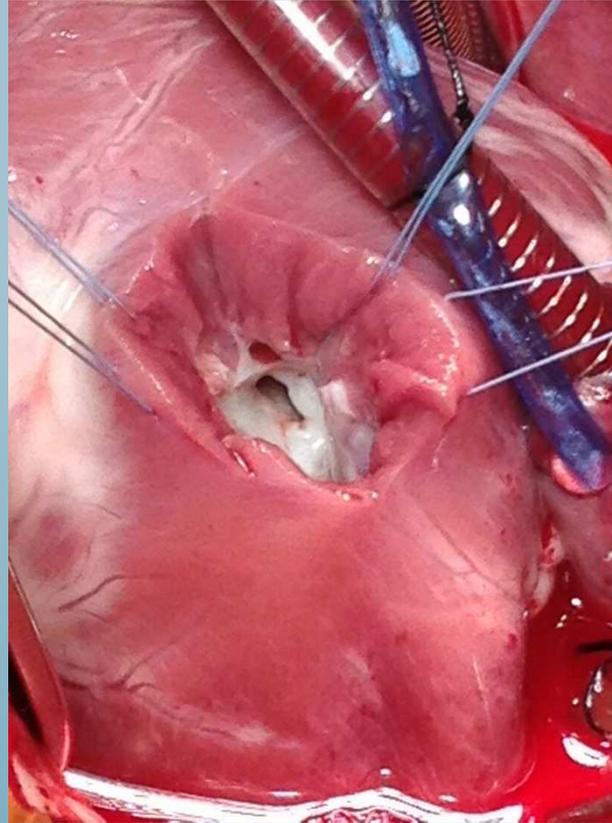
# CARDIAC BYPASS



# CARDIAC BYPASS



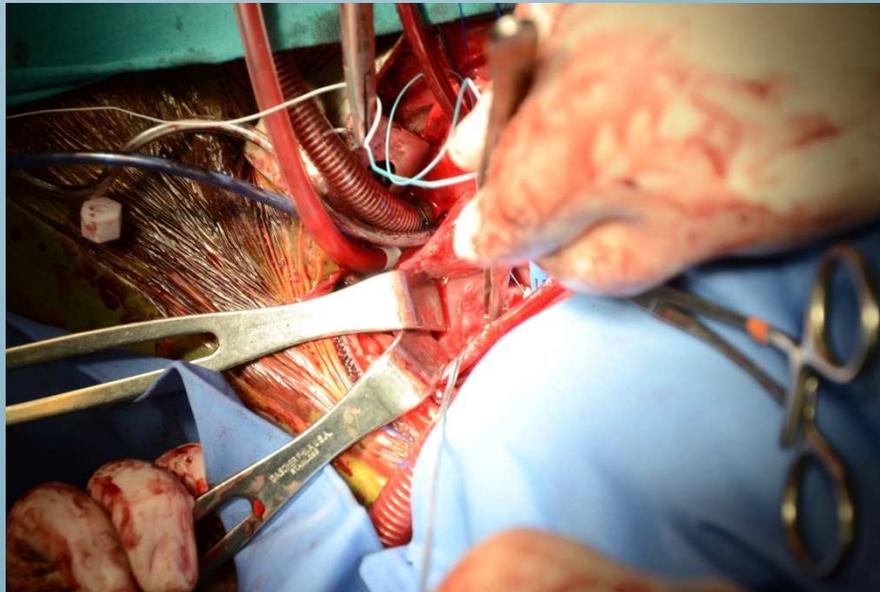
# CARDIAC BYPASS



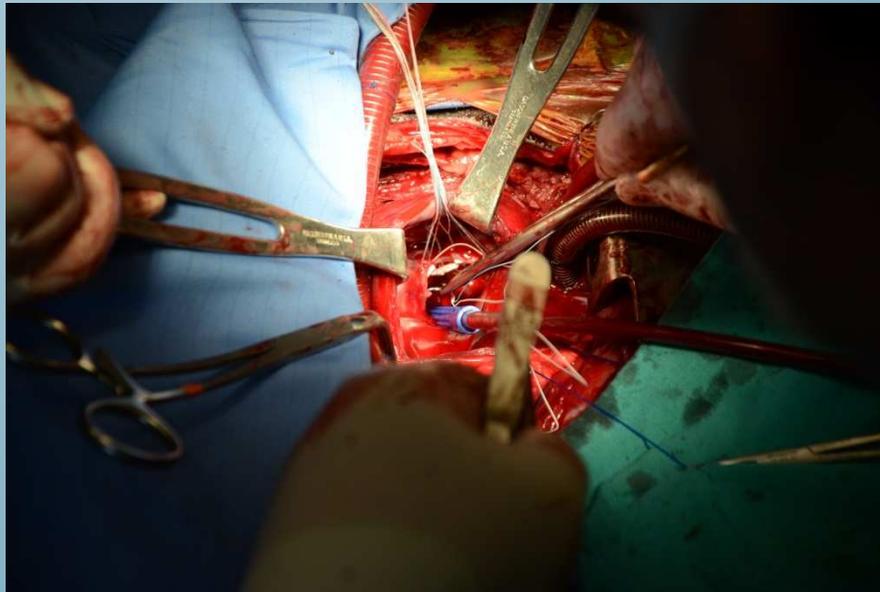
## **CARDIAC BYPASS**

- *Cardiac bypass – Case 5*
- *Tricuspid valve replacement for stenotic dysplastic valve*
- *Atriotomy performed, septal leaflet left in place, other leaflets removed and annulus opened up*
- *Valve secured with sutures*
- *Excellent mechanical result*
- *Dog recovered well and 36 hours later developed severe neurological dysfunction*
- *No response to management - dog was euthanased*

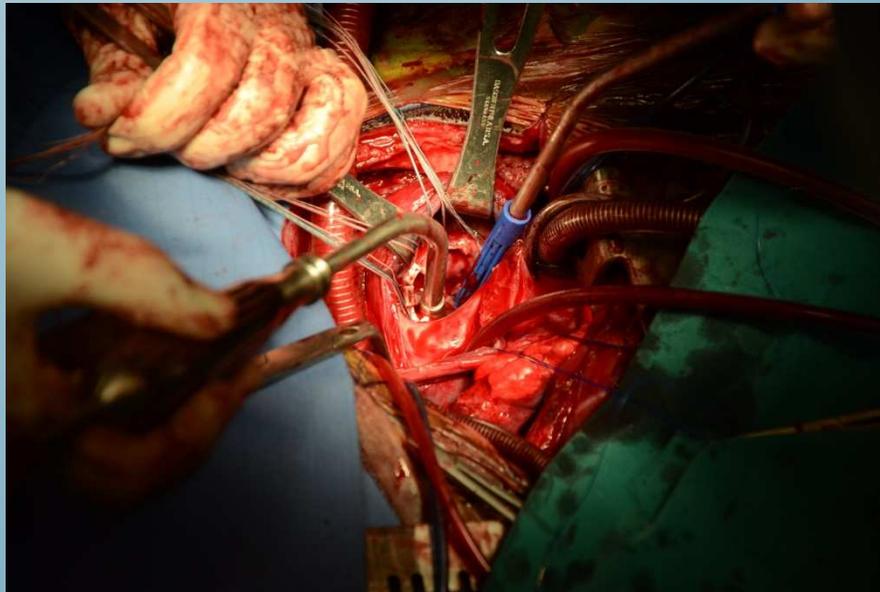
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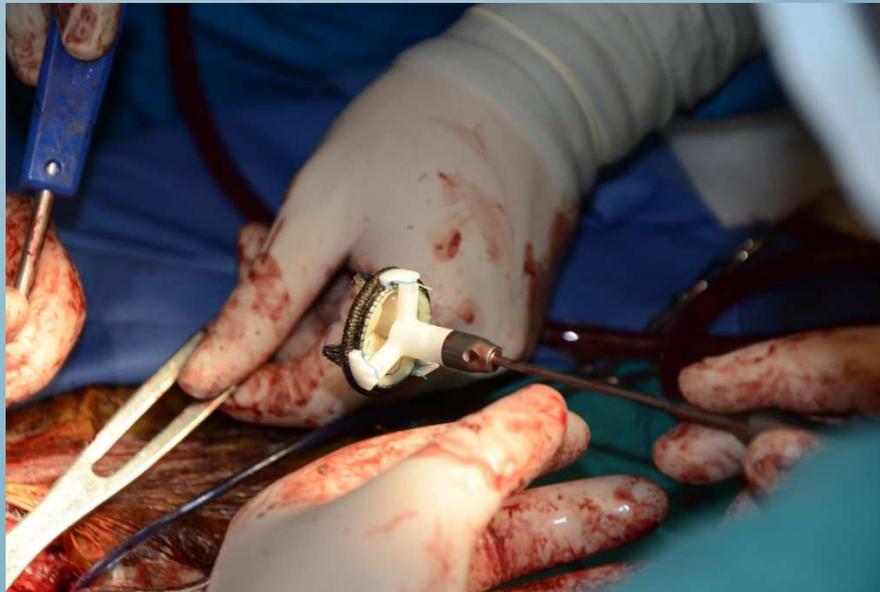
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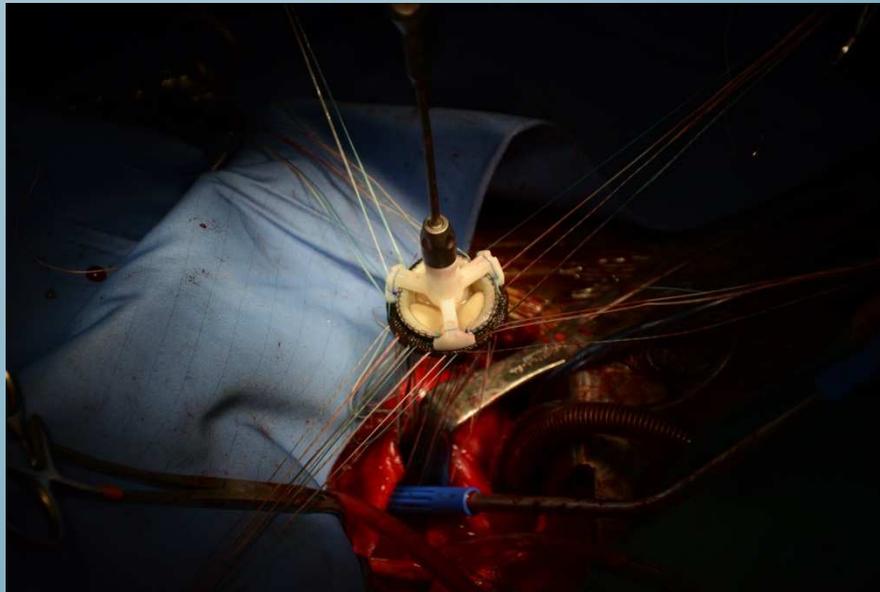
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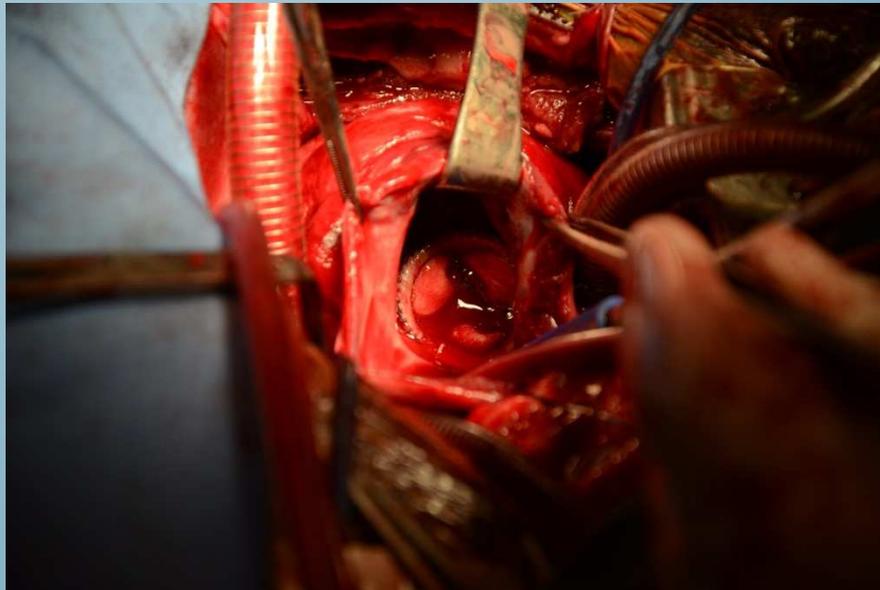
# CARDIAC BYPASS



# CARDIAC BYPASS



# CARDIAC BYPASS



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