Orangutan Cardiology 101

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Mild cardiomyopathy → Clinical disease in 1.5 yrs

Intensive treatment X 6 weeks.

Euthanized Aug 2011 (26 years old)
Orangutan Cardiology 101

1. Orangutans are SPECIAL
2. Orangutan cardiology lags BEHIND
3. Orangutan cardiac cases in US
4. The Great Ape Heart Project
Orangutans are Not Chimps, Humans or Gorillas

- Orangutans split off 12-16 mya
- Gorillas: 6-8 mya, Humans 4.5-6 mya

*Image from Orangutan Foundation International

*Image from bigfoot website*
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Orangutans do it ....

....Slowly and with Less Energy

• Solitary life style
• Slow growth rate
• Longest inter-birth interval of mammals
• Males can arrest sexual development
• Decreased energy expenditure
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What does this mean for their hearts?
Ape Hearts in the Literature

**Gorillas**
- Since the mid-1990s: 20 year head start
- Normal heart U/S and BP values
- Pacemaker/defibrillator

**Chimpanzees**
- Normal heart U/S values
- Implanted heart monitor
- Cardiac biomarkers (blood tests)
Orangutan Cardiology: Literature (or lack thereof)

6 case reports on orangutan heart disease
• 2: congenital conditions
• 2: post mortem reports
• 2: management of disease
– 2009 most recent

SUCCESSFUL TRANSABDOMINAL SUBXIPHOID PERICARDIOSTOMY TO RELIEVE CHRONIC PERICARDIAL EFFUSION IN A SUMATRAN ORANGUTAN (PONGO ABELII)


Abstract: A 46-yr-old female Sumatran orangutan (Pongo abelii) was first diagnosed with pericardial effusion in July 2006. Percardioscutia performed in January 2007 only provided short-term relief. In May 2007, a pericardial-peritoneal window was created using a transabdominal subxiphoid pericardiectomy technique, providing intermediate and long-term relief. Seven months later, the orangutan was euthanized due to worsening heart failure, and no pericardial effusion was present. Transabdominal subxiphoid pericardiectomy offers a straightforward surgical approach that can provide significant relief in cases of chronic pericardial effusion in large apes.

Key words: Pongo abelii, orangutan, pericardial effusion, subxiphoid pericardiectomy

BRIEF COMMUNICATION

A 46-yr-old female Sumatran orangutan (Pongo abelii) was anesthetized for a routine health examination and surgical placement of a mediastinal aortic valve implant. She had no previously recorded health problems other than obesity and a pregnancy 2 yr previously that resulted in a stillbirth.

The orangutan was hand injected with medetomidine (Dormitor, Pfizer Animal Health, New York, New York 10017, USA; 0.024 mg/kg) and thoracic radiographs were taken. An enlarged cardiac silhouette was noted. Transeptal echocardiogram of the heart suggested pericardial effusion as well as reduced contractility of the myocardium. Based on these findings, a follow-up evaluation with a transesophageal echocardiogram was scheduled to better evaluate the heart and pericardial effusion.

Six weeks later, the orangutan was anesthetized again using ketamine (7 mg/kg) and midazolam (Zoopharama, Laramie, Wyoming 82070, USA; 0.2 mg/kg) followed by propofol. At surgery, pericardial fluid was removed via thoracotomy. Pericardial adhesions were released and a pericardial-peritoneal window was created. The pericardial-peritoneal window allowed for significant relief of the heart and effusion. A mediastinal aortic valve implant was placed due to the enlarged cardiac silhouette.

The orangutan was discharged uneventfully from surgery and returned to her indoor enclosure.
What next?

- Orangutan cardiac knowledge lags behind.
- Can we extrapolate from humans or other apes?
Cardiac Differences?

Compared to humans:
- Gorillas hearts contract more (higher EF)
- Gorillas have thicker heart walls

Humans: atherosclerosis
Gorillas: aortic dissections

Atherosclerosis.
What we know so far...

- **Chimps & Gorillas**
  - Myocardial fibrosis predominant

- **Orangutans**:
  - Myocardial fibrosis predominant
  - More aortic atherosclerosis seen in orangutans compared to other apes?

Normal heart

Severe fibrosis
(Fibrotic fibers stain red)
Orangutan Cardiology: Pathology

• 20% of adult deaths due to heart disease
  – Additional 12% contributory

• Cardiac disease & chronic kidney disease?
How are we doing?

In 2011, 15% of zoos report finding pre-mortem heart disease in an orangutan.

8 orangutans diagnosed with cardiac disease while still alive.
Cardiac Cases in US

8 known Orangutan cases:

- 6.2: 3 Sumatran, 3 Bornean, 2 Hybrid
- average age at diagnosis:
  - 39 years (range 24-63 years old)
- 5 are still alive and on medications
- 3 died average 1.4 years after diagnosis
Premmortem Diagnoses

- 5 orangutans had asymptomatic disease
  - Discovered during routine exams
- 3 orangutans were examined for illness
  - Decreased/inconsistent appetite
  - Lethargy and/or coughing
Premortem Diagnoses

- 7/8 cases diagnosed via U/S
Treatments

- Diuretics: furosemide
- ACE Inhibitors: lisinopril, enalapril
- Beta blockers: carvedilol, metoprolol
- Positive ionotrophs: digoxin
Recommend cardiac evaluation of apes by an experienced cardiologist in conjunction with routine exams.

http://greatapeheartproject.org/
How are Orangutans doing?

Number of cardiac exams sent to GAHP:

1. Gorillas: 245 gorillas (549 exams)  
   – 72% of US population
2. Chimps: 79 chimps (97 exams)  
   – 10% of US Zoo & Sanctuary population
3. Orangutans: 57 orangs (89 exams)  
   – 27% of US population
4. Bonobos: 52 bonobos (129 exams)  
   – 65% of US population
Telazol & Ketamine:
• Increase heart rate
• Increase blood pressure

Isoflurane:
• Decreases blood pressure
• Decreases heart contractility
  – Effect on measured ejection fraction?
Voluntary Cardiac Ultrasound

- Awake cardiac ultrasounds
  - Zoo Atlanta: Alan has had 27 awake exams!
  - Cameron Park Zoo

Training with Rudi and Tammy at Houston Zoo

Volunteer gorilla at Detroit Zoo.
Voluntary Blood Pressure Measurement

- Tough Cuff blood pressure monitor
- Gorillas... and some orangutans

HZI BP cuff on a gorilla at Zoo Atlanta.

Sleeve for Tuff cuff.

HZI BP Cuff in Zoo Atlanta’s sleeve.
Let’s DO This!

• YOU are the advocates
• YOU are the trainers
• YOU have the information

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Points to Remember

• Orangutans are NOT red headed gorillas
• Routine cardiac exams are a MUST!
• Helping the GAHP helps ALL of us!!
• Voluntary blood pressure and cardiac ultrasound are important training goals

......and now, Dr. Jose Banchs.....