



# Voice and Swallowing Issues post Anterior Cervical Decompression and Fusion

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11<sup>th</sup> September 2015

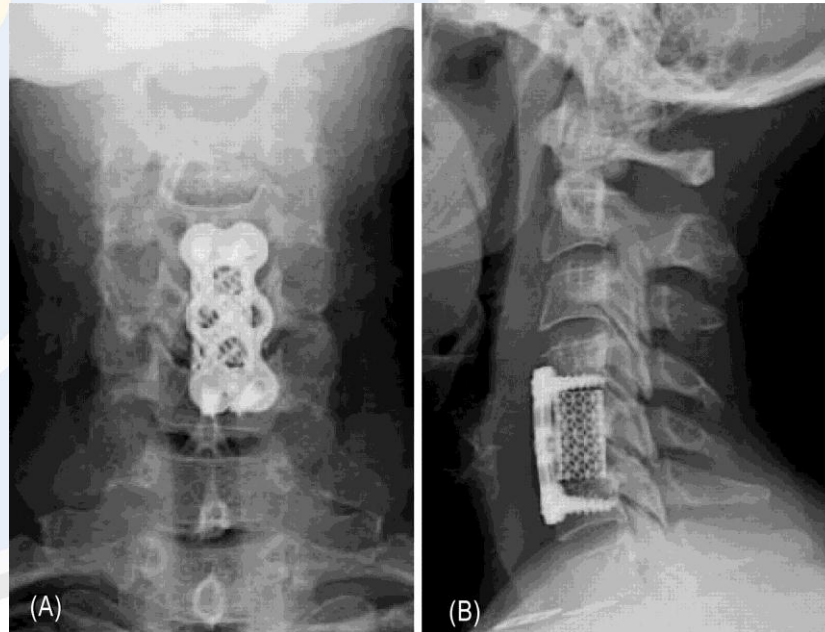
A facility of South Eastern Sydney  
Local Health District



# Anterior Cervical Decompression and Fusion (ACDF)

or

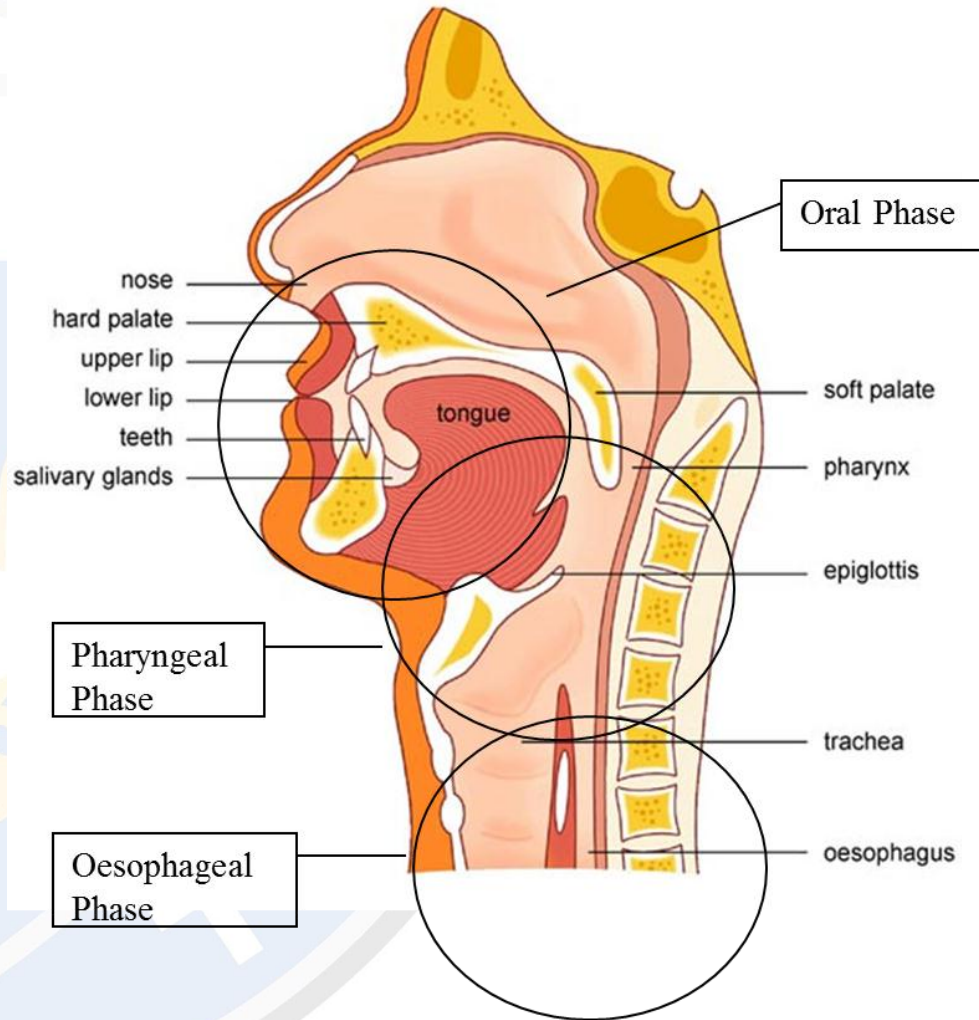
## Absolute Certainty of Difficulty Feeding



# Overview

- Normal Swallow
- ACDF Surgery and potential structures involved
- Incidence and Severity in the literature
- Risk factors for dysphagia
- Post op dysphagia and dysphonia
- Cervical Orthoses
- Dysphagia Management
- POWH Cases

# Normal Swallow



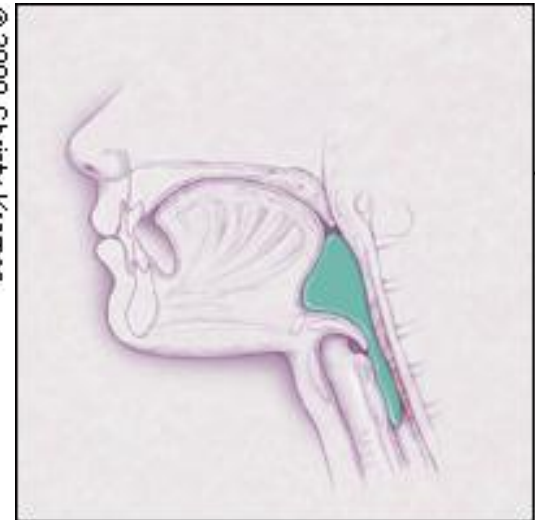
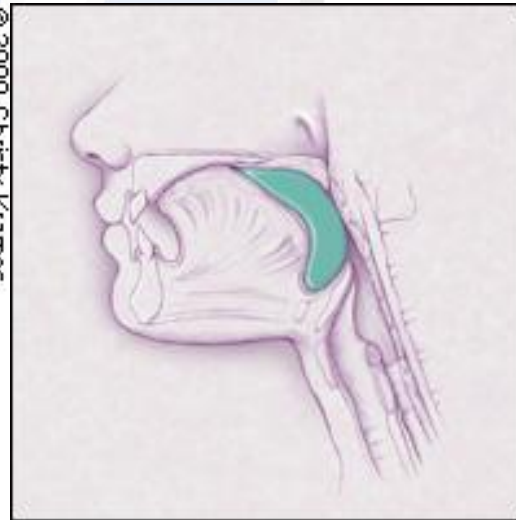
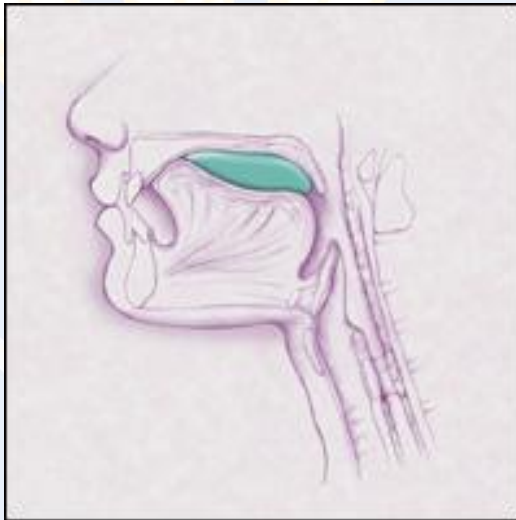
# Normal Swallow

Swallowing requires six cranial nerves

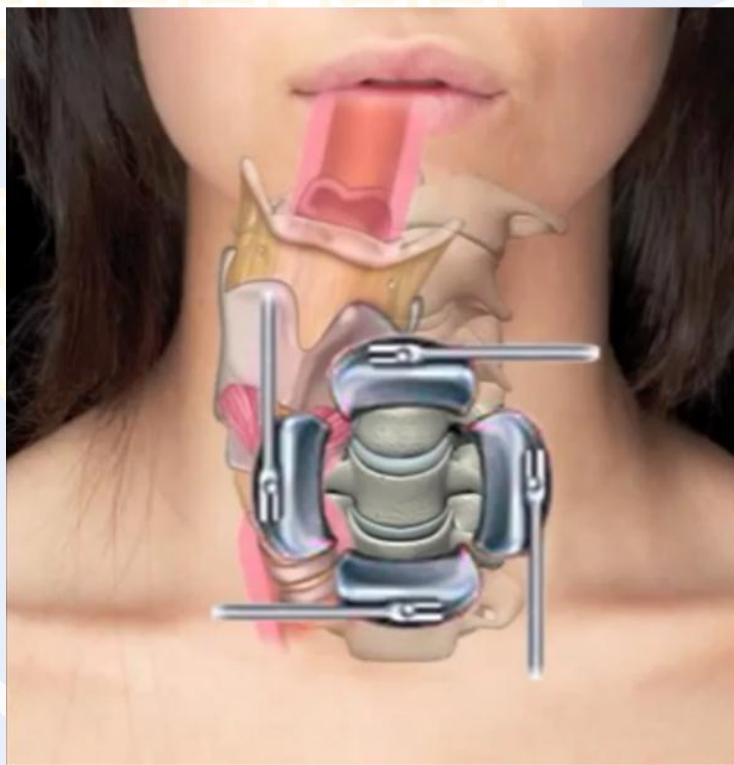
CN V, VII, IX, X, XI, XII

&

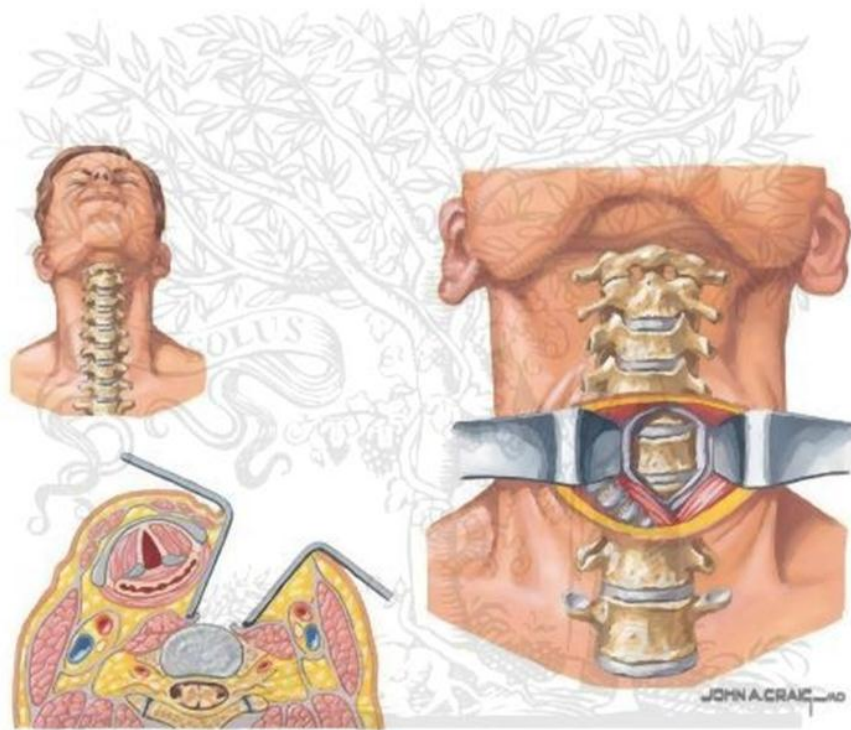
26 muscles -some of which include the pharyngeal constrictors, stylopharyngeus, levator veli palatini and cricopharyngeus



# ACDF Surgery



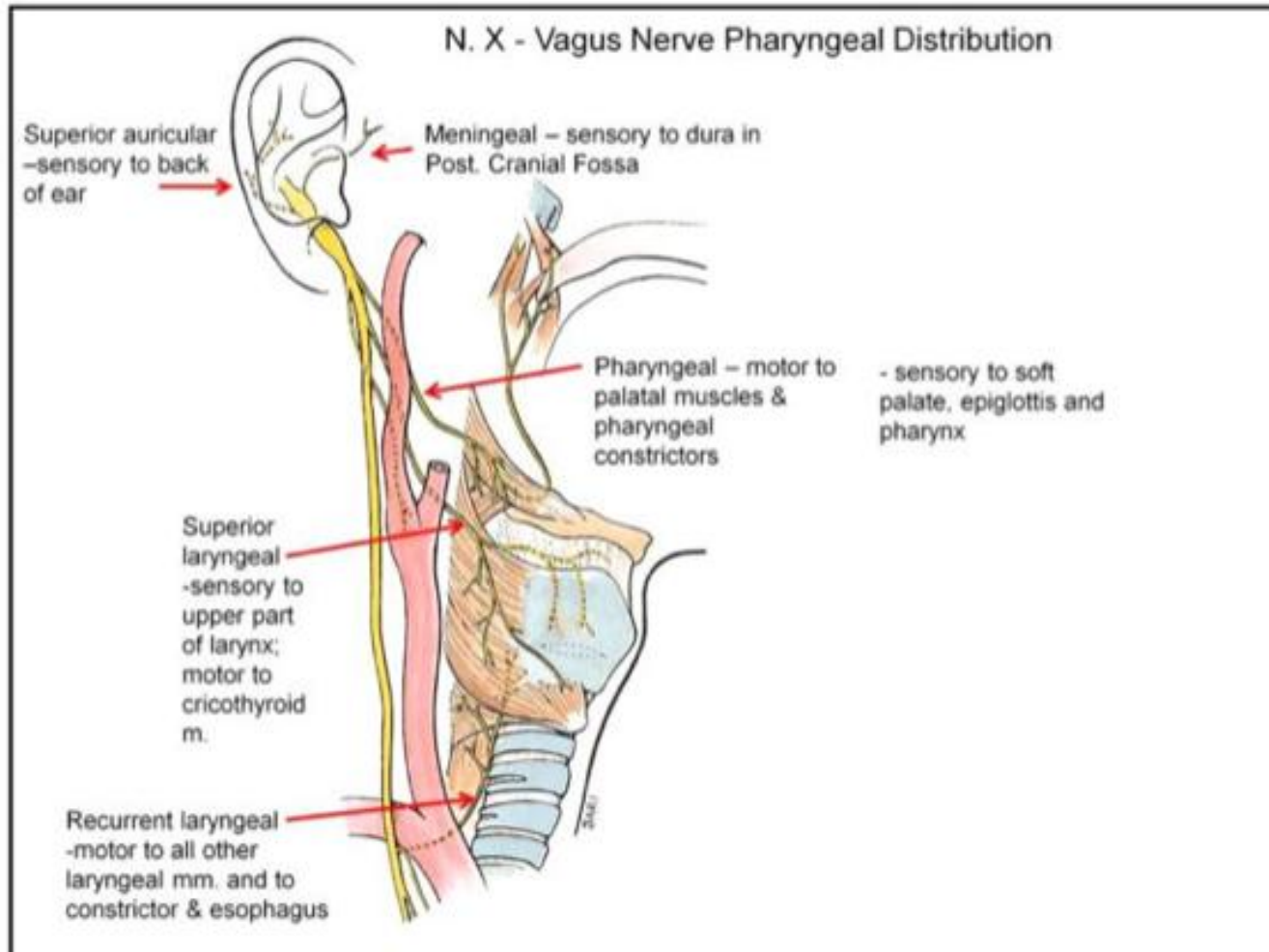
<https://www.youtube.com/watch?v=n-pjZxEy6Rw>



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# Recurrent Laryngeal and Superior Laryngeal Nerves



<http://imgbuddy.com/pharyngeal-branch-of-vagus-nerve.asp>

# CNs and Muscles at Risk

Structures potentially at risk during cervical spinal surgery

- Glossopharyngeal and Hypoglossal nerves above C3
- Superior Laryngeal nerve at C3-4
- Recurrent Laryngeal nerve and Vagus trunk at C5-T1
- Cricopharyngeus muscle at C5-6

(Lee et al )





■ INSTRUCTIONAL REVIEW: SPINE

# Dysphagia following anterior cervical spinal surgery

A SYSTEMATIC REVIEW

The Bone and Joint Journal  
2013

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# Dysphagia post ACDF

- Incidence of post-op dysphagia between 2% and 70%
- High incidence in the first weeks post surgery however decreases and plateaus out.
- Persistent dysphagia, potential for years after the surgery.

Yue et al 2005- 35% incidence 7.2yrs post

Olsson et al 2015- 26% incidence at 2.75yrs  
(33 months) post.

# Severity of Dysphagia post ACDF

## Bazaz-Yoo Dysphagia Questionnaire

Symptom Severity	Liquid food	Solid food
None	None	None
Mild	None	Rare
Moderate	None or rare	Occasionally (only with specific food)
Severe	None or rare	Frequent (majority of solids)

Yue et al, 2005

**Table 4** Preoperative and postoperative dysphagia

	Preoperative (%)	Early postoperative (%)	At review (%)
None	72 (97.3)	40 (54.1)	48 (64.9)
Mild	2 (2.7)	11 (14.9)	13 (17.6)
Moderate	0	18 (24.3)	12 (16.2)
Severe	0	5 (6.8)	1 (1.4)

Yue et al 2005

**Incidence and Severity of Dysphagia More Than 1 Year Postoperatively**

Dysphagia	No. (%)
No	74 (74)
Yes	26 (26)
Severity	
Rare	2 (8)
Mild	7 (27)
Moderate	12 (46)
Severe	5 (19)

Olsson et al 2015

# Dysphonia post ACDF

Yue et al 2005

**Table 5** Preoperative and postoperative dysphonia

	Preoperative (%)	Early postoperative (%)	At review (%)
None	72 (97.3)	51 (68.9)	60 (81.1)
Mild	0	8 (10.8)	5 (6.8)
Moderate	2 (2.7)	13 (17.6)	6 (8.1)
Severe	0	2 (2.7)	3 (4.1)

# Risk Factors- Cho et al 2013

**Table II.** Significant risk factors for dysphagia following anterior cervical spine surgery (rhBMP-2, recombinant human bone morphogenetic protein-2)

<b>Risk factor</b>	<b>Supporting study (study design, number of subjects)</b>
Female gender	Lee et al <sup>4</sup> (prospective, n = 348) Bazaz et al <sup>2</sup> (prospective, n = 249)
Multiple level procedures	Lee et al <sup>4</sup> (prospective, n = 348) Bazaz et al <sup>2</sup> (prospective, n = 249) Riley et al <sup>19</sup> (retrospective, n = 454)
Revision procedures	Lee et al <sup>4</sup> (prospective, n = 348)
Duration of procedure	Riley et al <sup>19</sup> (retrospective, n = 454) Rihn et al <sup>18</sup> (prospective, n = 94)
Older age	Smith-Hammond et al <sup>23</sup> (prospective, n = 83)
Prominent plate profile	Lee et al <sup>12</sup> (prospective, n = 156)
rhBMP-2	Buttermann et al <sup>6</sup> (prospective, n = 66) Vaidya et al <sup>24</sup> (retrospective, n = 46) Shields et al <sup>21</sup> (retrospective, n = 151)
Neck pain	Riley et al <sup>19</sup> (retrospective, n = 454)

# Risk Factors for Dysphagia & Dysphonia

- Patient Factors

Female

Advancing age

Smoking

Neck pain

- Surgical characteristics

multi level procedure- 3 or more levels

Primary vs revision procedures

longer surgery time

cervical plate prominence

# Dysphagia post ACDF

- MBS footage

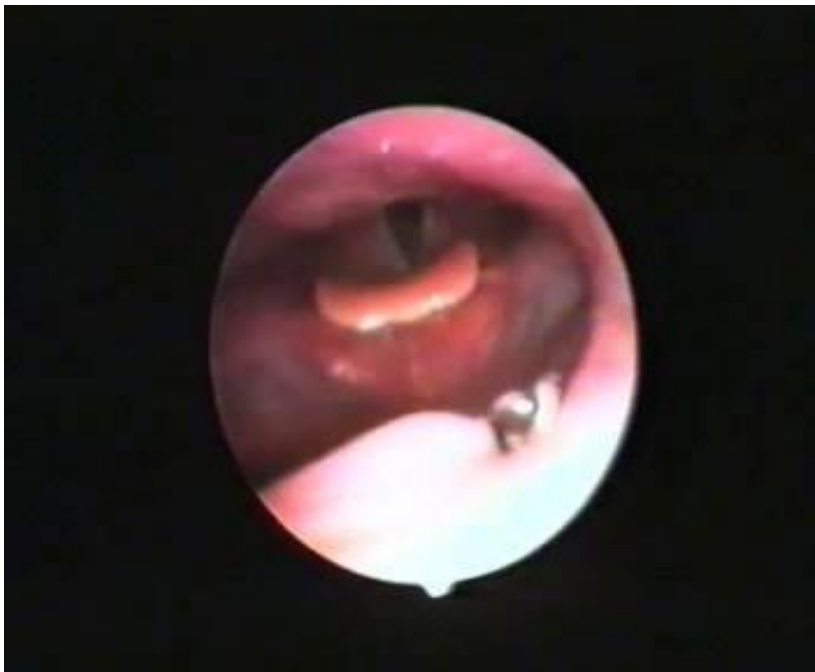


# Post Op Dysphagia and Dysphonia

- Impaired pharyngeal contraction
- Reduced laryngeal closure
- Reduced epiglottic deflection
- Reduced UES opening
- Neuropraxis of RLN and SLN
- Post op soft tissue oedema
- Post op haematoma
- Oesophageal injury

Leonard and Belafsky 2011

# Fiberoptic Endoscopic Evaluation of Swallow



Normal endoscopic view

FEES Footage  
post ACDF

# Cervical Orthoses

- Subtle mechanical changes to the swallow
- Stambolis et al 2003- effect of cervical bracing on swallow in healthy volunteers (n=17).

Changes in parameters seen on MBS with bracing condition of SOMI brace and Halo vest

- point of swallow initiation
- presence & amount of pharyngeal residue
- change to bolus flow and laryngeal penetration
- reduced hyoid bone elevation
- no aspiration identified

# Cervical Orthoses

1. Brace itself alters the natural movement during the swallow
2. Mandibular pads on a SOMI brace may restrict hyoid bone movement
3. Forced 90° head-spine alignment
4. Limits use of compensatory swallow strategies.



<http://www.surgico.co.nz/products/s-o-m-i-brace/>

# Dysphagia Management post ACDF

- Compensatory Swallow Strategies
  - e.g. altered head positioning- head turn
  - diet modifications
  - mendelsohn manoeuvre
  - effortful swallow/double swallow
- Rehabilitation Swallowing Exercises
- Surgical Management- referral to ENT
  - VC medialisation
  - cricopharyngeal myotomy / botox

# ACDF pts Referred to Speech Path.

	Sex	Cause	Sx	Level	SP IAx	Dysphagia	Dysphonia	Return to oral intake	Other
1	M	non trauma	NeuroSx Rt	C5-7 redo	D 3	severe	Y Rt VC palsy	against SP recomm.	MBS Halo
2	M	trauma	Ortho Lt	C5-6	D 3	severe	Y Lt VC palsy	NBM PEG at 5mths	MBS C3-4 oestoph.
3	F	trauma	NeuroSx Rt	C6-7	D 3	moderate	Y Rt VC palsy	Day 15	MBS Head turn to Rt
4	M	trauma C4 ASIA D	NeuroSx Rt	C4-5	D 3	severe	N	NBM PEG at 7mths	Trache MBS/FEES C-P myot at 5mths
5	M	trauma C4 ASIA D	NeuroSx Rt	C6-7 redo	D 2	severe	Y Rt VC palsy prolapse arytenoid	NBM PEG at 7mths	Trache MBS/FEES C-P myot VC medialis at 5mths

	Age	Cause	Sx	Level	SP IAx	Dysphagia	Dysphonia	Return to oral intake	Other
6	M	trauma C5 ASIA C	Ortho Lt	C4-5	D 8	moderate	N	Day 34	MBS
7	M	trauma C4 ASIA D	Ortho Lt	C3-4	D 2	mild-mod	N	Day 8	
8	M	trauma C4 ASIA C	Ortho Lt	C3-4	D 10	mild-mod	Y	Day 10	Head turn to Lt
9	M	trauma	Ortho Lt	C3-4	D 8 outpt	mild	Y No VC palsy	Day 1	MBS outpt
10	M	non trauma	NeuroSx Rt	C6-7	D 1	none	Y	Day 1	D/C day 4
11	F	trauma C4 ASIA A	Lt interstate	C4-6	On TF D 24	mild	N	prior to TF	
12	M	trauma C4 ASIA A	NeuroSx Rt	C3-4 C4-5	D 13	mild	N	Day 18	Trache
13	M	trauma C6 ASIA D	NeuroSx Rt	C6-7	D 6	none	N	Day 6	

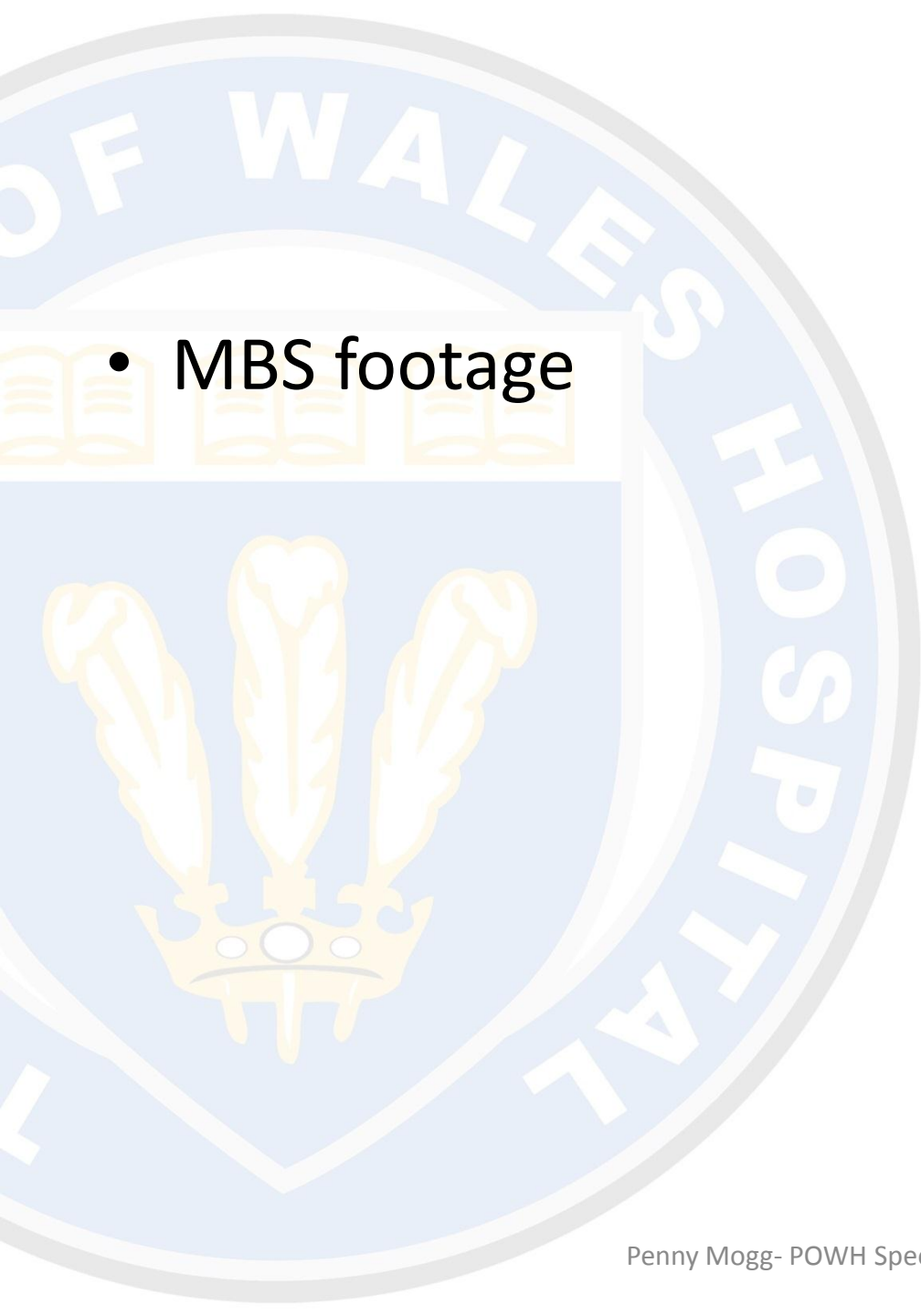
# Speech Pathology ACDF Cases

- Total 13 – 2:11 female:male
- Dysphagia incidence – 11/13  
Severity 4 severe dysphagia (3 NBM with PEG)  
2 moderate dysphagia  
2 mild-moderate  
3 mild dysphagia  
2 no dysphagia
- Dysphonia incidence – 7/13  
4/7 confirmed VC palsy



# Acute on Chronic Dysphagia

- Syncope - fall and sustained C5/6 #
- C5/6 ACDF left sided approach
- Dysphonia- ENT consult- Left VC palsy
- Dysphagia on Speech Path Bedside Ax
- MBS
- Incidental finding of large osteophytes at C3-4



- MBS footage



# Emerging Research

- DAISY Project- Jackie McRae, UK  
Dysphagia following Acute cervical Spinal cord injury

# In Summary

- Critical structures for voice and swallow can be affected
- Dysphagia and dysphonia common immediately post op and longer term
- Incidence and severity is varied and often under reported
- Exact aetiology and specific risk factors are unclear