



Oral Flora & Stroke – a Role in improving survival

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Definition of stroke

- A sudden neurological deficit of presumed vascular origin, lasting greater than 24 hours or leading to death within 24 hours
- The abrupt onset of focal or global neurological symptoms or signs caused by ischaemia or haemorrhage into or around the brain as a result of cerebral blood vessel diseases
- A transient ischaemic attack is a stroke that clinically resolves within 24 hours



Stroke is a common problem 2.4/1000 per year

Rises with increasing age

12% of UK deaths are due to stroke

Large resource implications – acute, rehabilitation
and community

£2.14 billion annually on stroke care



Introduction

Mortality after stroke:

High incidence of non neurological causes of death following acute stroke

Pneumonia is responsible for 20% of these
Silver *et al* 1984

Risk factors for pneumonia:

Immobility

Dysphagia/Aspiration

Respiratory muscle weakness

?? abnormal oral flora



Dysphagia

- Up to 45% of patients admitted following acute stroke have evidence of aspiration on water swallow test

Gordon *et al* 1987

- 40% of patients with dysphagia die within one month of stroke

Barer *et al* 1989

- 48% of dysphagic stroke develop lower respiratory tract infection compared to 22% of non-dysphagia patients

Walsh *et al* 1992



The mouth in stroke

- Weakness of orofacial muscles
- Pooling of saliva
- Saliva which normally inhibits adherence of bacteria is altered
- Increased numbers of anaerobic Gram negative bacilli in the mouth (AGNB)
- Abnormal adherence of AGNB to the epithelial cell surfaces



Nosocomial respiratory tract infections

- Normally caused by AGNB
- First acquired in oropharynx and GIT before systemic infection occurs
- In health, oral mucosa is covered by glycoprotein fibronectin
- Damage to mucosa provide receptor sites for AGNB



The oral microflora

- acquisition of microorganisms begins at birth
- oral flora changes with dentition, puberty, pregnancy, acute illness, old age
- difficult to determine exact composition of oral flora

Do AGNB matter in stroke patients?



AGNB pneumonia in stroke patients despite appropriate antimicrobial therapy has a high morbidity and mortality.

Do patients with stroke have an increased incidence of AGNB in their oral flora?



Study Aim and Design

The aim was to assess the incidence of AGNB in the oral flora of patients following acute stroke to correlate this with any evidence of dysphagia and assess clinical outcomes in various groups.

- 50 patients following acute stroke
 - 16 male (69-90 years)
 - 34 female (71-99 years)
- 24 left sided cerebral hemisphere lesion
- 23 right side cerebral hemisphere lesion
- 3 brainstem



Methods

- Oral swabs taken from day one at frequency of at least three times per week
- Quantitative bacterial evaluation and microbial identification were performed

Isolation is the finding of the organism on one occasion

Carriage is the finding of the organism on two consecutive occasions



Results

- AGNB isolation = 23 patients (46%)
- AGNB carriage = 17 patients (34%)
- Acquired on average 2.5 days post stroke
- Persisted until discharge or death in 13 patients (76% of those with AGNB carriage and 26% of total)



A summary of the patients sampled and the carriage of AGNB

Group	n =	Denture wearers (%)	AGNB carriage (%)
Acute stroke	50	29 (58)	17 (34)
Rehabilitation	25	20 (80)	1 (4)
Acute hospitalised	50	42 (82)	4 (8)
Healthy volunteers	25	15 (56)	0 (0)



Results

Total 117 isolates

Top five organisms found:

- Enterobacter species 30%
- Escherichia species 21%
- Klebsiella species 15%
- Morganella species 12%
- Proteus species 8.5%

Others including: Serratia, Pseudomonas,
Acinetobacter, Chryseomonas, Citrobacter



Outcomes

	Patients who died	Survivors
	11	39
Carriage	6 (55%)	11 (28%)
At risk of aspiration	8 (73%)	18 (46%)
Both carriage and aspiration	4 (36%)	8 (21%)



Discussion

- High incidence of carriage (34%)
- High mortality associated with AGNB carriage (54%)
- High mortality associated with dysphagia
- Majority of isolates were respiratory pathogens sensitive to an SDD protocol



SDD protocol

- Eradication of AGNB by selective decontamination of the oropharynx and GIT with oral non-absorbable antimicrobials
- Pathogenic aerobic flora is suppressed whilst the anaerobic and indigenous flora remains intact
- Standard regime: tobramycin, polymyxin E and amphotericin B



Is there a role for SDD in stroke?

- SDD used in ITU
- Radiotherapy, chemotherapy following burns
- No trial of SDD in stroke
- Is it cost effective?
- Collaboration between Geriatric Medicine, Dental Sciences and Health Economics



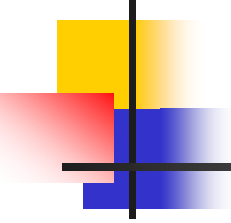
SDD protocol

- Using this regime in cardiac surgery patients reduces mortality rate
- In the ITU setting this regime plus parenteral cefotaxime reduced acquired infection from 24 to 10%



SDD

- polymixin E, tobramycin Amphotericin B in a carrier gel.
- instilled into the oral cavity four times daily
- continued for two to three weeks
- oral swabs three times weekly to monitor oral microflora

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- 200 patients – Assent *vs.* Consent
 - Acute stroke
 - No DM, steroids, immunosuppressive therapy
 - SDD gel containing antifungal and non-absorbable antibiotics (amphotericin B, colistin and polymixin E) for 2 or 3 weeks
 - Oral swabs on 9 separate occasions
 - Swallowing assessment – safe / unsafe



Results

- 200 patients in 50:50 double blind placebo controlled trial
- Age 16-96 – median 72
- M:F = 108:92
- Abnormal swallow – 40 patients
- Subdivided for swallow status



Organisms

- Escherichiae coli
- Enterobacter especially sakazakii
- Klebsiella spp
- Pseudomonas spp
- Serratia spp



Active group:

- less isolation of organisms $p < 0.005$
- less carriage of organisms $p < 0.005$
- less episodes of pneumonia $p < 0.005$
- shorter duration of hospital stay $p = ns$
- better survival $p = ns$



Future work on oral flora

- Different patient groups e.g. Parkinson's disease, PEG tubes, motor neurone disease
- The effect of altering saliva
- Effects of drugs e.g. acid suppression or acidic drugs
- Effect of naturally occurring substances such as mannose on the oral flora