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PHASE TWO BLOCK THREE

ASSIGNMENT

OTOSCLEROSIS AND STAPEDECTOMY

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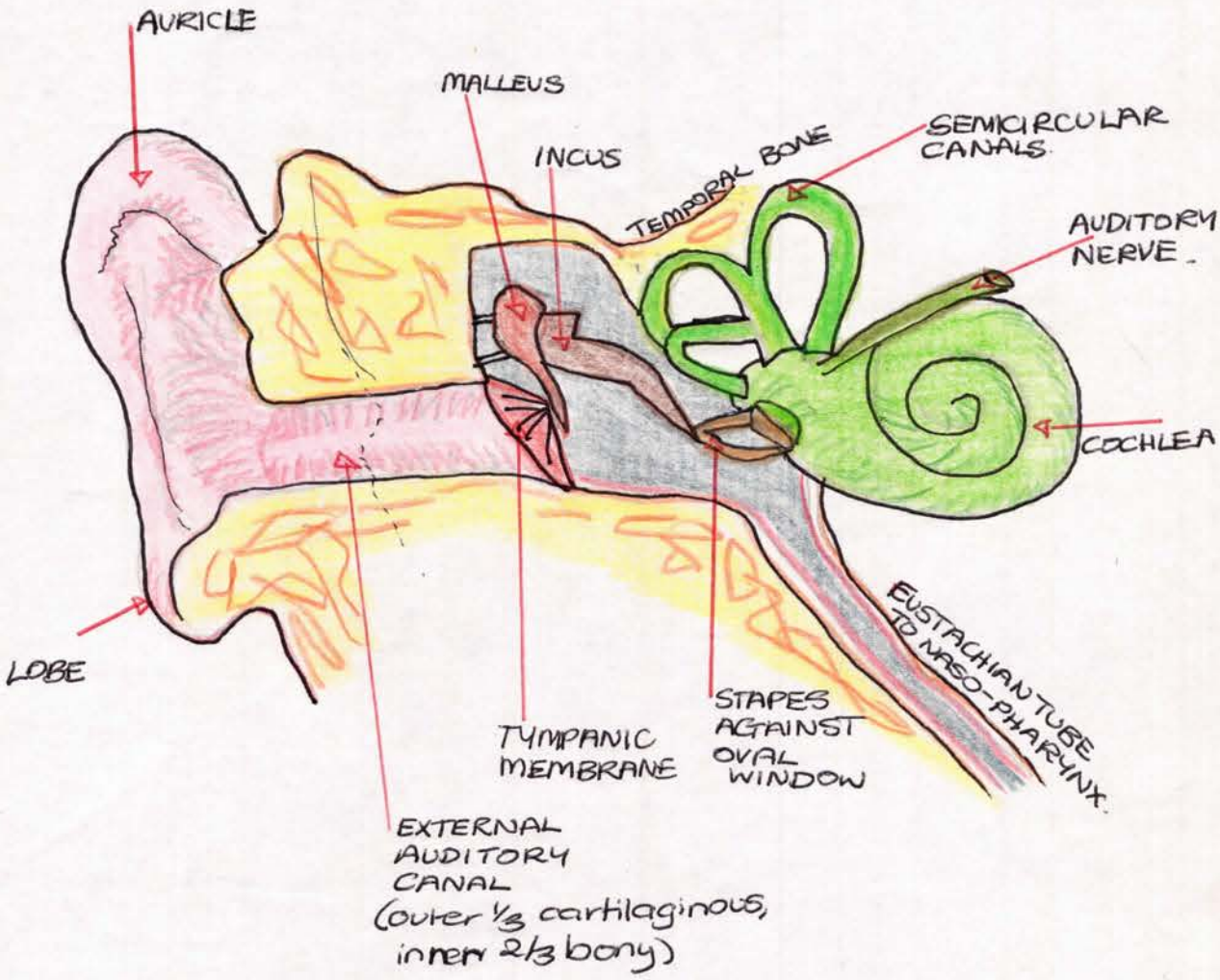
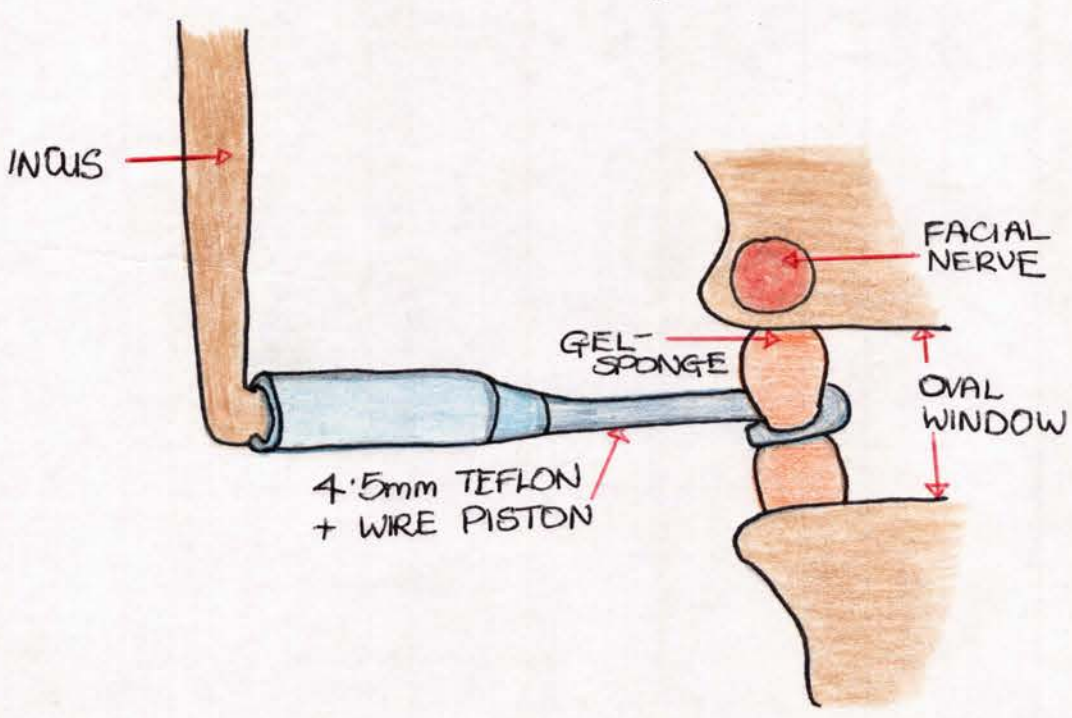
THE GENERAL ANATOMY OF THE EAR.





THE MIDDLE EAR SHOWING THE REPLACEMENT PROSTHESIS POST-STAPEDECTOMY.

OTOSCLEROSIS AND STAPEDECTOMY.

OTOSCLEROSIS is a disease of unknown aetiology, affecting the middle ear and causing progressive conductive deafness.

The disease tends to run in families, and is twice as common in women as in men. There is also a greater incidence of otoslerosis in the white populations of the world.

Otosclerosis has an insidious onset, often commencing in young adulthood, but may not be detected until several years after the onset. Hearing loss is bilateral.

In otosclerosis there is the formation of new spongy bone in the labyrinth, immobilizing the stapes and preventing sound transmission by the vibrating ossicles through the oval window to the inner ear fluids.

The patient may present with a history of slow, progressive hearing loss, and complain of tinnitus(buzzing or ringing in the ears) and occaisional vertigo or dizziness.

The diagnosis of otosclerosis depends on the results of audiometric tests and the confirmation is made at tympanotomy. There are other differential diagnoses which must be excluded prior to the commencement of treatment.
These are:-

a) eustachian blockage due to nasal swelling (allergy) or nasopharangeal tumour
b) dislocation or mal-development of middle ear ossicles
c) catarrhal (adhesive) otitis media or tympanosclerosis
d) abnormal tissue growth around the stapes(peristapedial tent).

There are three surgical methods of treatment for otosclerosis:
Fenestration: bypasses the fixed stapes & creates a new window which serves as a substitute for the immobile oval window, through which sound can be conducted into the inner ear.
Stapes mobilization: re establishes the normal pathway of sound to the cochlea by freeing or mobilizing the fixed stapes.
Stapedectomy, which was the chosen method of treatment in this case.

A stapedectomy involves the removal of otosclerotic lesions at the footplate of the stapes, and the implantation of a prosthesis. This has the effect of restoring the pathway of mechanical conduction of sound waves by the ossicles of the middle ear, through the oval window to the inner ear.

Patient's history

The patient, a 52-year-old man with a progressive hearing loss for approximately 20 years, was referred to an E.N.T. surgeon. He described a history of tinnitus and occaisional dizziness, and was suffering from a severe bilateral hearing loss. There was no history of middle ear infection. He had found that his hearing loss was a continual embarrassment to him, and was causing communication problems with his wife and family, also making it very difficult for him to participate in any social activities. A hearing aid hadfailed to improve his hearing to any noticeable degree over the past five years.

Diagnosis

Examination of the ear with an otoscope revealed bilateral intact tympanic membrances, with a reddish glow(This may suggest the membrane was atrophic, a common finding in otosclerosis).

The Rinné test was performed to determine whether the deafness was conductive or sensorineural. In this test an activated tuning fork was applied to the skull and the sounds reached the middle ear clearly. However, when the tuning fork was held next to the patient's ear, a hearing loss was found, i.e. Rinné test was negative. Therefore, the patient had a conductive hearing loss due to some blockage of the sound pathway through the middle ear.

Audiometry was performed in a soundproof room. An audiogram presents a graphic outline of the patient's hearing as measured by tones of different pitches. Sound stimulus consists of a pure (musical) tone. The louder the tone required before the patient hears it, the greater the hearing loss. The patient was instructed to don earphones and to signal when he heard the tone, and again when the tone disappeared. The thresholds for these different tones were plotted on a graph. Air conduction was measured by applying tone directly to the external auditory opening. Nerve conduction was measured by applying the stimulus directly to the mastoid process. Normal ear perception is 20cycles per second to 20,000cps. By testing through the critical speech range it was found that from air conduction the hearing loss was quite marked. A full E.N.T. examination excluded other causes for the sound not reach the inner ear by the normal conducting pathway.

The diagnosis made was otosclerosis. The E.N.T. surgeon, after further consultation and discussion with the patient and his family, decided to perform a right stapedectomy. He then explained the operation to the patient.

Admission to hospital

The patient was admitted to Bendigo Base Hospital, one day prior to the scheduled operation. He was greeted by the admission staff and welcomed to the hospital. Anaesthetic and operation consent forms were signed and the patient recieved an identification band. He was then escorted to the ward. On arrival in the ward he appeared anxious and bewildered by the busy ward atmosphere. He was introduced to the nursing staff and shown his preparedbed where he was made comfortable. The nurse who was admitting him explained the ward layout and routine. She spent some time talking to him, at the same time completing a history sheet and clothes list. His temperature, pulse, respirations and blood pressure were found to be within normal limits, and a urinalysis showed no abnormalities. The patient was asked if he had any allergies to foods, drugs or materials.

Pre-operative investigations

An E.C.G. was performed to detect any possible arrhythmias and was found to be normal. Chest x-rays were taken to ensure that the lungfields were clear prior to anaesthesia. Blood tests were ordered and blood was taken for laboratory analysis for the following tests: Full blood count-to determine if any infection was present; Haemoglobin estimation-to ensure that the patient was not anaemic; Urea and electrolyte levels- to ensure that the patients kidneys were functioning properly and that the necessary ions were present.(A deficiency of K^+ may have led to cardiac arrest under anaesthesia.)

Psychological care
The usual reactions of a patient admitted to hospital are those of insecurity, anxiety and apprehension. In this case they were compounded by the fact that the patient had a severe hearing loss. It was very important for the nurse to make a special effort to communicate clearly with him, as he required additional attention to be certain that he understood important directions and procedures which were being performed on him. If he did not know what was happening to him, he may have appeared to be unco-operative. The nursing staff spoke slowly and clearly to him, asking him at times to repeat what had been said, or if he understood. Throughout his entire stay in hospital all procedures were explained in detail and this resulted in the staff gaining his confidence. This was important as anxiety may reduce even further the patient's ability to hear.

During his stay in hospital the chaplain attended the patient at his request.

Pre-operative instruction and prophylaxis
The patient was instructed by the nursing staff in deep-breathing, coughing and leg exercises pre operatively. The need to do these exercises hourly post-operatively was explained to the patient. This helped to avoid post-operative chest complications and deep vein thrombosis.
It was explained to the patient that his hearing may not improve immediately after the operation because of the dressing in the ear canal. He was also told that he must limit his head movements post-operatively and must avoid nose-blowing, sneezing and coughing.

Skin preparation
It was extremely important that the bacteria on the skin in the operative area was reduced to a minimum. This reduced the number of bacteria that were carried into the deeper tissues from the skin when the surgeon made the incision. The hair was washed and the skin around the right ear washed thoroughly. The area around the ear was shaved. Note NO antiseptic lotions were used in skin preparation because they have ototoxic properties.

Preparation of the alimentary tract
Suppositories were admimistered on the evening prior to surgery, with satisfactory bowel preparation as the result. Food and oral fluids were restricted preoperatively to reduce the possibility of vomiting and aspiration during anaesthesia. The patiend was fasted from midnight. This was explained to him, his water jug and food were removed and a FASTING sign affixed to the bed.

Anaesthetist's visit
The patient was visited by the anaesthetist on the evening prior to surgery. During his visit he examined the patient for pulmonary problems and upper respiratory tract infection, and asked the patient about his smoking habits.
The anaesthetist then prescribed a premedication: Morphine 15mg I.M. to be given one hour prior to scheduled surgery.

Immediate pre-operative preparation
Prior to surgery the patient was kept fasting from midnight. He was asked to void, then showed and dressed in theatre gown, cap and leggings. His temperature, pulse, blood pressure and ventilation rate were recorded on the anaesthetic form as a baseline for theatre staff. The completion of the skin preparation was checked. The patient was given a mouthwash and removed his dentures which were stored in a safe place. (This was marked on the theatre sheet.) Jewellery eg. watch was removed and his wedding ring taped. He was questioned to make certain that he had not eaten sice midnight. The identification band on the patient's wrist was checked for accuracy and a theatre identification label affixed to his gown. Finally, the patient was rested in bed (made up with clean linen) and covered with two procedure blankets. He was given his premedication at the prescribed time. The bed rails were raised, the patient partly screened and bright lights turned off. He was told not to try to get up, and left to rest.

When the porter arrived for the patient, his chart was checked for the following:
- operative permit present and signed
-dentures in/out recorded on chart
-urinalysis and vital signs recorded
-premedication charted, including dose and time given
-any significant observations of the patient or allergies were noted
-x-rays were taken to theatre with the charts.
The patient was gently transferred to the trolley and accompanied by the nurse to theatre. He was reassured and comforted during this time.

Theatre
On arrival he was met by the theatre nurse, who checked his identity and charts. He was accompanied by her during the induction of general anaesthesia, then transferred to the operating table. The skin around the ear was washed with Hibitane and rinsed liberally with normal saline, then draped with sterile drapes. All precautions were taken to ensure asepsis during the operation. This included such factors as: the use of freshly sterilized instruments; all sterile drapes were of a double thickness; the surgical team were dressed in sterile wrap-around gowns and wore caps and masks, the operating microscope was draped with a sterile cover.

Under the operating micorscope, a curved incision was made behind the ear, and tissues retracted and dissected until the facial canal and pyramidal process were visible. At tympanotomy it was observed that the stapes was adhered to the oval window by an otosclerotic lesion. This was removed and sent to pathology for examination. Otospongiosis- a conditon of bone where the Haversian canals are absent, was reported by the pathologist. A 4.5 mm teflon and gel-sponge around wire prosthesis was inserted. On end of the prosthesis was attatched to the incus, the other to the graft or plug to transmit sound to the inner ear. The wound was closed and the ear packed with gauze impregnated with Kenacomb.
An intravenous infusion was inserted during the operation.

Outline nursing careplan for post-stapedectomy

Postoperatively:

(2) Early care.

Problem	Approach/action	Rationale	Response (1)
Potential obstruction of airway follows anaesthesia.	1. Prepare bed with O_2 & suction . Post-op tray . Pillow 2. Pulse, resps, and BP are recorded $\frac{1}{4}$hrly until conscious, $\frac{1}{2}$hrly for 4 hrs, hrly for 2 hrs, then 4hrly.	General anaesthesia depresses reflexes eg. cough, therefore the patient must be protected until they return fully.	When the patient was returned to the ward from the recovery room, he was conscious and his reflexes had returned. All vital signs were found to be satisfactory after some immed. post-op hypotension.
Dislogement of graft	1. Be gentle in transporting of patient. 2. Ensure limited head movement only, caution patient against making sudden movements. 3. Patient lies on unaffected side with operated ear positioned uppermost. 4. Ensure canal dressing is left undisturbed, if necessary renew outer dressing only. 5. Remind patient to avoid nose-blowing, coughing and sneezing 6. Strict bed rest for 48hrs.	Rough or sudden movement may dislodge graft These body actions increase the pressure of air in the nasal and pharangeal passages and force air up the eustachian tube into the middle ear, so may dislodge the graft.	These precautions were observed and the graft remained in place.
Nausea and vomiting	1. administer anti-emetic as prescribed (12.5mg Stemetil I.M. 4hrly P.R.N.)	Nausea may be caused by anaethesia or by disturbance to the inner ear.	The patient experienced severe nausea for 2 days. Stemetil was administered as ordered with relief.

Problem	Approach/ action	Rationale	Response
Needs to maintain a fluid balance.	1. Small sips of fluids commenced 2-3 hrs post-op. 2. All I.V. fluid and oral fluids must be charted. 3. If vomiting occurs it is measured and described. 4. Urine- the nurse observes that the pt. voids normally post-op.	Anaesthesia may cause post-op naus[illegible] Estimation of fluid loss indicated the severity of the problem. Some drugs used in anaesthetics may affect the functioning of the bladder muscle.	Fluids were not tolerated for 36 hrs and so mouth washes and ice chips only were given until nausea subsided. The patient voided without difficulty post-op.
Fear and anxiety of the unknown.	Explanation and reassurance to the patient about every aspect of his care. Answer all his questions- if the nurse does not know the answers she should ask someone who does.		This built up the confidence of the patient and gave him some feeling of being in control of what was happening to him.
Required an intravenous infusion.	1. Cannula site must be kept clean and dry by daily dressings.	This was necessay because of the high probability of post-op nausea and vomiting. The fluid used was 4.3%Dextrose + N/5 saline 1 litre 12hrly.	
	2. observe for inflammation and oedema.	Inflammation around the intravenous site may indicate thrombophlebitis or infection. Oedema may signify that the cannula has been dislodged & fluid is being infused into the tissues	On the post operative day the site was sore and Lasonil was applied with relief.

Problem	Action/Approach	Rationale	Response
Required an intravenous infusion.	3.The limb sould be splinted and care must be taken not to disturb the cannula when carrying out 4hrly pressure care.		
	4.Check the rate of infusion frequently, and check the tubing for kinks and bubbles.	The infusion must run to time or there is a danger of circulatory overload. Bubbles may cause an air embolism.	Fluids were commenced and completed according to orders. The infusion was discontinued on the first day post-op.
Damage to surrounding structures during the operation.	1. Observe patient for loss of taste on the affected side.	This indicates the chorda tympani nerve is cut.	
	2.Report without hesitation any of the following signs:-inability to close eye -epiphora on the affected side -inability to close mouth - saliva drooling from corner of mouth. -one sided frowning or smiling.	These are signs of facial paralysis, caused by damage to the facial nerve.	None of these signs were present.

Problem	Approach/ action	Rationale	Response
Post-op ear pain.	Report same to Dr. and administer any analgesia prescribed.	May be caused by irritation of the auditory nerve or infection.	No complaints of pain
Prevention of infection and fever.	1. Take temperature and report any elevation to Dr. 2. Administer prophylactic antibiotics as prescribed (Amoxicillin 250mg T.D.S.)	May be an indication of infection, external otitis, or otitis media.	Patient remained afebrile.
Headache	1. Report to the Dr. 2. Administer analgesia as ordered.	May be caused by infection or nerve encroachment.	No complaints of headache.
Be alert to any cranial complications following ear surgery.	Report immediately anyof the following: changes in mental state headache, neck stiffness photophobia, fever, rigor irritability, restlessness, apathy, delerium nystagmus	Probable causes: brain abcess meningitis, subdural abcess lateral sinus thrombosis meningitis brain abcess labyrinthitis	None of these signs were detected.

Problem	Approach/action	Rationale	Response
Needs assistance with general hygiene.	1. The patient is sponged for the first 48 hours.	In the early post-op period the patient must keep still to avoid disturbing the graft site.	
	2. 4hrly pressure care during bedrest; keep skin clean and dry and the bed-clothes free from wrinkles.	This is necessary to prevent pressure sores forming on pressure areas.	
	3. 4hrly mouth care.	The patient's mouth will be dry if he is not receiving an adequate oral intake.	
Vertigo and dizziness.	1. Instruct patient to move slowly.		
	2. Have bed rails in position at all times while patient is in bed.	The patient with vertigo is more prone to falling out of bed.	
	3. Ensure patient is accompanied by a nurse during early ambulation.		The patient had more confidence than when walking alone as he was unsteady on his feet.
	4. If vertigo is intense and accompanied by fluctuating hearing, report to Dr.	May be an indication of a perilymph leak. Vertigo may also be symptomatic of labyrinthitis or inner ear reaction.	Slight vertigo was relieved by rest, no fluctuating hearing was reported.

In this case, apart from 2 days of nausea, postoperative recovery was straightforward and uneventful.

Subsequent Care

Day 1 post-op:
Intravenous removed when tolerating diet and fluids.
Day 7:
Kenacomb pack removed from external ear and sutures removed. Pack replaced by a loosely fitting piece of sterile wool in the meatus, and patient was instructed to change this twice daily.
Day 10: Discharge.
Prior to discharge, the following instructions were given:

1. Post-pone hair washing for 2 weeks.
2. Avoid getting water in the ear for 6 weeks - eg. no showers or swimming.
3. Avoid nose blowing for 1 week.
4. Protect ears when outdoors for the first week.
5. Avoid exposure to people who have colds, so preventing any upper respiratory tract infection.
6. Avoid flying and deep water diving for several months.
7. Explain to the patient that he may expect a gradual return of hearing but the true result is not known for several months.
8. An appointment was made to see the Doctor in his sugery in one weeks time.
   This is necessary to :
   a) Inspect the drum and the wound.
   b) Repeat audiometric tests for comparison with pre-operative values.
   c) Assess the need for surgery on the other ear.
   d) Assess if the patient is fit to resume work at this time (17 days post-op)
9. The patient was instructed to continue taking the antibiotics as prescribed until he had finished the course.

Conclusion
In conclusion, if we take into account the severe disadvantages in communication which the patient was faced with prior to operation, and contrast it with the remarkable improvement in hearing which was confirmed by audiometry 4 months later, we can appreciate the success of the stapedectomy and prosthesis implantation performed. The patient is enjoying much improved family relationships anda more satisfying social life.

Note: Lack of space prohibited printing of the full text of postoperative care and planning in this assignment, which was given a nursing process format.

Notes on drugs used

NOCTEC
Chloral Hydrate
Action: sedative and hypnotic; induces sleep and dulls the senses.
Dose: 500mg 15-30 before bedtime
Side Effects: Gastric irritation
In overdosage- general CNS drpression occurs, leading to respiratory depression.
Tolerance and physical dependence may occur.

Morphine Sulphate
Action: Narcotic; moderate dose depresses the CNS, thus relieves pain and produces sleep. Is of particular value in pre-medication because it relaxes the patient and allays anxiety.
Dose: according to the patients weight and the severity of the pain: 5mg-20mg
Side Effects: excessive dosage produces a depression in the respiratory centre, causing unconsciousness and coma.

KENACOMB ointment
Triamycinolone Acetonide 0.1%, Neomycyn Sulphate 2.5mg, Gramicidin 0.25mg, Nystatin 100,000U per Gram.
Action: topical corticosteroid- suppresses inflammation and allergic response of the skin. — plus antibacterial and antifungal
Specific Precautions: The patient must be on adequate concurrent antibacterial treatment as necessary.

STEMETIL
Prochlorperazine Maleate.
Dose: 12.5mg I.M. 4 hrly P.R.N.
Action: useful in labyrinthine disorders, nausea and vomiting. (blocks the dopamine receptors)
Side effects and toxic effects
May cause postural hypotension, may lower convulsive threshold, drowsiness, disturbance of temperature control, atropine-like effects(dryness of mouth, tachycardia), photosensitisation, blood dyscrasias, skin reactions, cholestatic jaundice.

AMOXIL
Amoxicillin
Actions: Broad-spectrum antibiotic active against susceptible strains of gram-positive and gram-negative organisms.
Dose: 250mg 8 hrly
Contraindication: history of allergy to penicillins
Specific Precautions: periodic assessment of renal and haemopoietic function during prolonged therapy, possibility of superinfections.

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