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ICON

GENERAL OBJECTIVE:

The student will acquire knowledge about the topic **"TETRALOGY OF FALLOT"** and develop desirable attitude and skills towards the topic and in future practice.

SPECIFIC OBJECTIVES

The student will be able to

- discuss the overview of tetralogy of fallot
- define TOF
- state the incidence of
- enlist the risk factors of
- list out the causes of
- state the pathophysiology of
- enumerate the classification of
- outline the diagnostic evaluation of
- describe about the management of
- list out the complication of
- explain about the prevention of

TOPIC INTRODUCTION

Before entering into the topic I will give you some clue so that you can guess today topic.

A congenital heart disease in which disease have R-L shunt with fours defects.

YES!!!! TETRALOGY OF FALLOT

Tetralogy of Fallot

S. NO	TIME	SPECIFIC OBJECTIVES	CONTENT	TEACHER'S STUDENT ACTIVITY	AV AIDS	EVALUATION
1.	3 mints	The students will be able to defining the tetralogy of fallot	**DEFINITION:** It is a congenital cyanotic heart disease that occurs in more than 10% cases of all congenital heart diseases. This condition is characterized by the combinations of four defects – 1. Pulmonary stenosis 2. Ventricular septal defect (VSD) 3. Overriding of aorta 4. Right ventricular hypertrophy **Pulmonary stenosis**- (pure valvular stenosis/combination of valvular and infundibular stenosis also occurs). **Ventricular septal defect**- is situated in the membranous or sub aortic part of the interventricular septum. **Overriding of aorta** – the overriding aorta is due to an abnormality of the aortic root. The aorta is not in alignment with the left ventricular outflow tract but is displaced to the right and overlies or 'over-rides' the interventricular septum from which it is separated by the high septal defect.	**Teacher:** teaching **Student:** listening	B L A C K B O A R D	What is meant by tetralogy of fallot?

2.	15mints	Describing the pathophysiology of tetralogy of	**Right ventricular hypertrophy** is not a developmental abnormality but is due to the altered hemodynamic caused the above three malformation. **PATHOPHYSIOLOGY:** 1. Degree of right ventricular outflow tract obstruction: typically occurs at multiple levels, including below the pulmonary valve (subvalvar or infundibular stenosis), at the level of the value (valvar pulmonary stenosis), and above the value (supravalvar stenosis). The degree of pulmonary obstruction determines whether the infant is cyanotic or acyanotic by affecting the amount of blood that shunts right to left at the ventricular septal defect (VSD). TOF with mild pulmonary obstruction is typically not a cyanotic lesion. There is no significant restriction to the flow of blood into the pulmonary arteries and therefore the infant is well saturated. TOF and significant pulmonary obstruction result in a cyanotic infant. This is because blood in the right ventricle has a higher resistance to overcome in order to enter the pulmonary	**Teacher:** teaching **Student:** listening **Teacher:** teaching **Student:** listening	B L A C K B O A R D	Explain the pathophysiology of tetralogy of fallot?

		fallot	circulation. Blood is shunted from the right ventricle to the aorta through the VSD and into the systemic circulation without being oxygenated in the pulmonary circulation. 2. Pulmonary artery anatomy: Pulmonary artery anatomy can dramatically affect the physiology. Pulmonary atresia with VSD (TOF with pulmonary atresia and absent pulmonary valve) are very different physiologically and are considered different disease processes from TOF. 3. Non- restrictive, mal – alignment VSD: Anterior mal-alignment VSD in TOF is nearly always non-restrictive. With a large, non – restrictive VSD, the pressure in the right ventricle and left ventricle equalizes. In this case, the VSD does not determine the degree of shunting. The degree of shunting in TOF is therefore due to the relative resistance to flow of the pulmonary versus systemic circulation. Additional VSDs may be present and should be looked for as these may complicate the post operative course. Hyper cyanotic spells, or TET spells / Blue spells are episodes of severe cyanosis associated with hyperpnoea. They result from	**Teacher:** teaching **Student:** listening	B L A C K B O A R D	

			an increase in right-to- left shunting across the VSD. The exact etiology of hypercyanotic spells is unclear, but they are thought to be initiated by increases in the right ventricular infundibular contractility. Hypercyanoticspells may be self-limited; however if sustained, they can result in brain ischemia or death. **CLINICAL FEATURES:** 1. Growth retardation 2. Central cyanosis (cyanosis may be missed, if it is mild) 3. Clubbing 4. Chest pain due to hypoxia 5. Headache due to hypoxia 6. Poor weight gain 7. Tachypnea 8. Dyspnea / breathlessness – degree of exertion dyspnea varies with the severity of the anatomical defects. 9. Syncope – common in infancy and may be precipitated by exertion. It is a common cause of death in infancy. 10. Cyanotic spells – also known as hypoxia spells or tet spells,	**Teacher:** teaching **Student:** listening	B L A C K B O A R D	

3.	10 mints	Enumerate the clinical features of tetralogy of fallot	occur in young infants, more common between 2 and 4 months of age. They are the result of an abrupt reduction in pulmonary blood flow or a decrease in systemic vascular resistance (SVR). Characteristic features are as follows: • Paroxysm of hyperpnea (rapid and deep breathing) • Sudden marked increase cyanosis • Irritability and prolonged crying • Decreased intensity of the heart murmur **DIAGNOSTIC EVALUATION**: 1. Details history of illness and thorough clinical examination are important diagnostic approach. Auscultation of soft or harsh systolic ejection murmur heard best at the upper left sternal border in third space P2 is usually single. 2. ECG: • Right axis deviation • Right ventricular hypertrophy 3. X-ray: • Normal-sized heart /small heart	**Teacher:** teaching **Student:** listening	B L A C K B O A R	List out the clinical features of tetralogy of fallot?

4.	10 mints		• Conspicuously clear lung fields due to pulmonary oligemia • Boot shaped heart • Right ventricular enlargement • Hypertrophy of the right ventricle displacing the left ventricle upwards and to the left, thereby producing the appearance of wooden shoe with an upturned toe-the Coeur en shoot. 4. Echocardiogram shows the infundibular stenosis, high VSD and RVH 5. Color Doppler study will show the flow of blood from the right ventricle into the aorta. 6. Selective right ventriculography • Simultaneous opacification of the pulmonary artery and aorta • Boot shaped heart 7. Aortography 8. Coronary arteriography 9. CT scan	**Teacher:** teaching **Student:** listening	D B L A C K B O	

		Enlist the diagnostic evaluation of tetralogy of fallot	10. MRI 11. Cardiac catheterization- visualization of the catheter, oxygen studies, pressure studies. **MANAGEMENT:** **<u>Medical Management</u>:** 1. Treatment of cyanotic spell – aim of treatment is to break the vicious circle by the following methods: • Holding the infant in knee-chest position traps venous blood in legs and decreases the systemic venous return. • Oxygen administration improves arterial oxygen saturation. • Morphine is anxiolytic and depresses the respiratory centre. It also acts as a dilator of venous capacitance, there by decreasing the venous return. Paroxysmal hyperpnoea will respond dramatically to morphine in relatively large doses (0.2 mg/kg body weight). • Intravenous propranolol (0.1 mg/kg) relives the subpulmonary muscular spasm, which is the cause of	**Teacher:** teaching **Student:** listening	A R D B L A C K B	

5.	20 mints		reduced pulmonary blood flow. It also acts as a peripheral vasoconstrictor and increases systemic venous resistance. • Vasoconstrictors, such as phenylephrine 0.02 mg/kg intravenously, raise the SVR and force more blood to the lungs. • Treatment of acidosis- sodium bicarbonate 2 ml/ kg (1 mEq / kg) is given intravenously to abolish acidosis and its stimulating effect on the respiratory centre. • Muscle paralysis and artificial ventilation in order to reduce the metabolic oxygen demand. 2. Treatment of Polycythemia – phlebotomy and volume replacement with fresh frozen plasma. 3. Maintenance of a patent ductus- Prostaglandin E1 in a dose of 0.05 – 0.20 μg/kg/minute causes dilatation of ductusarteriosus and provides adequate pulmonary flow until surgical repair is done. 4. Prevention of complications – the following preventive measures should be taken to prevent complications:	**Teacher:** teaching **Student:** listening	O A R D L C D	Explain the management of tetralogy of fallot?

		Briefy explain the management of tetralogy of fallot	• Avoid dehydration –due to the presence of polycythemia, any factor that diminishes the available plasma volume is dangerous. • Relative iron deficiency anemia (IDA) is treated with iron. The diet for children with TOF should have more iron. Folic acid supplementation is also required due to increase production of red blood cells (RBCs). • Prophylaxis against infective endocarditis – antibodies cover for infections, surgical and dental procedures and maintenance of good oral hygiene. • Oral propranolol therapy may prevent the cyanotic spells. • Precautions to avoid clot formation during intravenous infusion are needed. Any clot in the circulation will predispose to paradoxical embolism. **<u>Surgical management:</u>** <u>Timing of Surgery</u> • Surgery is done at birth or later in infancy depending on the severity of defects, weight and general health of the baby, and	**Teacher:** teaching **Student:** listening	L C D	

			severity of the symptoms. • When severe symptoms develop in the first or second month of life, an initial shunting operation should be done which is followed by repair within 12 months. • When a patient is asymptomatic or only mildly symptomatic, repair can be deferred until 2 years of life. • In Severe TOF, surgery can be done in neonatal period. • In babies who are too small or too weak, palliative surgery can be done immediately and total corrective elective surgery can be done in late infancy. **Palliative shunt Procedures:** Indications • Recurrent spells • Packed cell volume >65 • Children who cannot tolerate total correction, excretion; extremely small pulmonary artery is one such condition. • Infants who become symptomatic in the first few months of life.	**Teacher:**te		

			Types of Palliative Surgery: A total correction cannot be done immediately after the diagnosis because the size of the pulmonary artery is small due to decreased flow. So, it is better that the size of the pulmonary artery be increased by increasing the pulmonary blood flow by certain procedures 1. **Blalock –Taussing shunt** (subclavian and pulmonary artery anastomosis) – subclavian artery is shunted to the ipsilateral pulmonary artery. In patients with right-sided aortic arch, left subclavian artery is shunted to the right pulmonary artery. This procedure will result in absent radial pulse on the side of the shunt and a continuous murmur at the level of shunt 2. **Modified Blalock – Taussigshunt**– subclavian artery is shunted to the ipsilateral pulmonary artery, using a conduit. Gore-Tex interposition shunt between the subclavian and the ipsilateral pulmonary artery is the procedure of the choice in small infant younger than 3 months. A left sided shunt is performed in patients with left aortic arch, and a right-sided shunt in patients with right-sided aortic arch.	aching **Student:** listening	L C D	

			3. **Waterston Shunt** (ascending aorta to right pulmonary artery anastomosis) – it is not performed because of complications such as large shunt (CHF, pulmonary hypertension), narrowing and kinking of the right pulmonary artery at the site of anastomosis. 4. **Potts- Smith shunt** – rarely performed because of complications such as CCF and pulmonary hypertension. It consists of direct side-to-side anastomosis of the descending aorta to the left pulmonary artery. In modified Potts operation, a graft is put between the aorta and pulmonary artery. The advantage of this procedure is that the aortic pressure does not directly go to the pulmonary artery. 5. **Glenn's shunt** – superior vena cava is anastomosed to the right pulmonary artery. 6. **Barret's procedure** – a palliative procedure. Stripping of pleura on both sides will lead to formation of granulation tissue. This predisposes to formation of collaterals develop from the following vessels: • Aorta	**Teacher:** teaching **Student:** listening	L C D	

			• Intercostal arteries • Internal mammary arteries • Bronchial arteries **Total correction**: It is the definitive treatment. If the pulmonary artery is good, surgery can be done at any age. Left atrium to aortic root ratio should be 1:1 (at least 0.8) for total correction. Types of total correction are as follows: • **Brock's procedure** (trans ventricular valvotomy or infundibulectomy)- the infundibulum is resected and the patch closure of VSD is done. Pulmonary valvotomy may also be done. Removing the obstruction to the pulmonary artery blood flow in the presence of a large. VSD will predispose to pulmonary congestion and ultimately pulmonary vascular obstruction. • **Rastelli's operation** – it is done for cases with severe hypoplasia or atresia of the rightventricular outflow tract. This is usually done after 5 years of age. The pulmonary artery is divided from the left ventricle and the cardiac end is overseen.	**Teacher:** teaching **Student:** listening	L C D	

			An intracardiac tunnel is placed between the large VSD and the aorta so that the left ventricle communicates with the aorta. The right ventricle is connected to the divided pulmonary artery by an aortic homograft or a value bearing prosthetic conduit. **Nursing management:** 1. Relieving respiratory distress by semi-up right position, clearing oral and nasal secretions, oxygen therapy, administering prescribed medication, (diuretic, bronchodilators) and prevention of aspiration with continuous monitoring of respiratory pattern. (ABG analysis, respiratory status). 2. Improving cardiac output by uninterrupted rest, minimum exercise (as play and other activities of daily living), maintaining normal body temperature and comfortable environment, administering medications (digoxin, antihypertensive) and monitoring child's condition (vital signs, heart sound). 3. Improving oxygenation and activity tolerance by continuous monitoring by pulse oximetry, oxygen therapy (by face mask or nasal cannula) and emotional support with physical rest.	**Teacher:** teaching **Student:** listening	L C D	

			4. Providing adequate nutrition – the child should be provided with small frequent feeding. Oral feeding should be limited to 15 to 20 minutes. Nasogastric tube feeding may be needed to provide extra calories, when oral feeding is not possible. The older children may required high calorie diet according to likes and dislikes. Feeding intolerance should be observed. Daily weight recording and maintenance of intake and output chart are compulsory. Adequate fluid intake should be allowed unless contraindicated. 5. Preventing infections by avoiding exposure to infections and infected person, good handwashing practices, maintaining general cleanliness and hygiene measures, completion of immunization schedule, early detection and treatment of upper respiratory infections and GI infections. 6. Reducing fear and anxiety by explanation, reassurance and answering questions of the child, parents and family members. Informing about available facilities and support services. 7. Teaching about health maintenance and follow up according to the level of understanding and child's problem are important.	**Teacher:** teaching **Student:** listening	L C D	

			Instructing about adequate diet, rest, immunization, prevention and control of infections, regular medical and dental check up. Teaching the parent and family members about signs and symptoms of complications and emergency care especially in hypoxic spells, dehydration, pulmonary edema, CCF, cardiac arrest, etc. Encouraging the parents to treat the child as in normal manner by avoiding overprotection, overindulgence and rejection. Promoting growth and development and avoiding projection of fear, anxiety and stress. Information to be given regarding available medical facilities, community health nursing services and social support for rehabilitation. **Complications:** 1. Anemia 2. Polycythemia 3. Cyanotic spells 4. Growth retardation – failure to thrive 5. Pressure on the trachea by enlarged aorta (stridor and wheezing) 6. Disseminated intravascular coagulation (DIC)	**Teacher:** teaching **Student:** listening	L C D	

			7. Bleeding disorders – thrombocytopenia 8. Hemoptysis may be due to DIC 9. Arthritis 10. CNS complications 11. Gout and hyperuricaemia 12. Infections 13. Paradoxical emboli 14. Metabolic acidosis **NURSING DIAGNOSIS FOR TETRALOGY OF FALLOT** 1. Risk for Decreased cardiac output related to structural abnormalities of the heart. 2. Activity Intolerance related to imbalance in the fulfillment of oxygen to the body's needs. 3. Impaired growth and development related to inadequate oxygenation, tissue nutritionneeds, social isolation. 4. Risk for infection related to the general conditions is	**Teacher:** teaching **Student:** listening	L C D	

			inadequate. 5. Altered Nutrition less than body requirements related to the excessive energy demands required by increased cardiac workload. 6. Altered family process related to having a child with a heart disease. 7. Knowledge deficit related to disease condition and surgical procedure.	**Teacher:** teaching **Student:** listening	L C D	

6				**Teacher:** teaching	L C D	

7.	5 mints 5 mints	List the complication of TOF		**Student:** listening **Teacher:** teaching **Student:** listening		What are the complications? List out the

		Identify the nursing diagnosis of TOF		**Teacher:** teaching **Student:** listening	L C D	nursing diagnosis of TOF?

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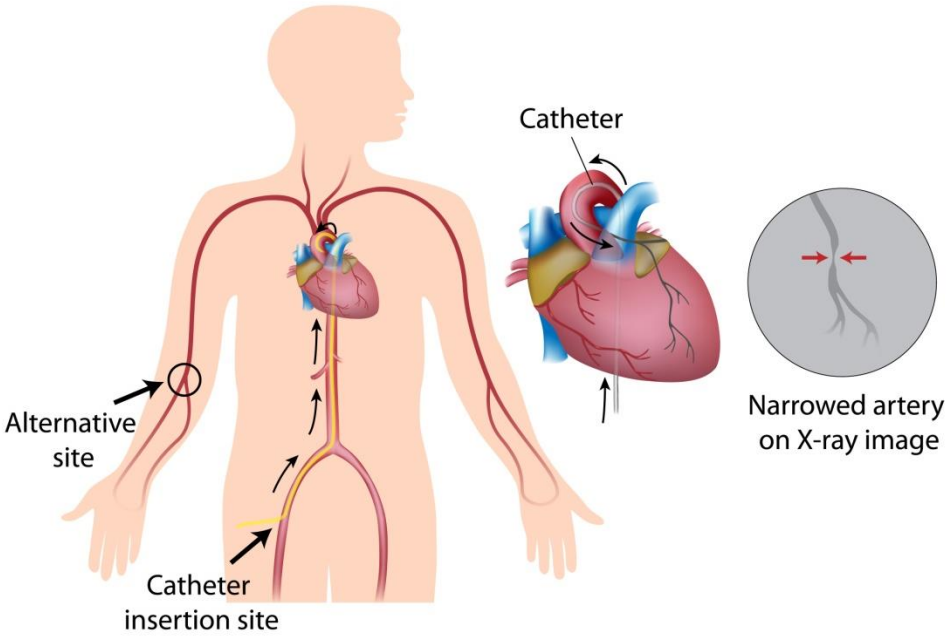
EVALUATION

1. What is name of the procedures



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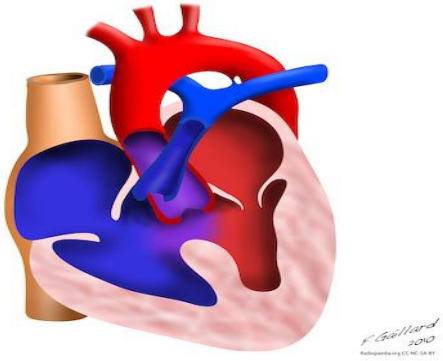

3. Identify the signs and symptoms

4. What is Tett spells ?

5. Identify the surgical procedure in picture