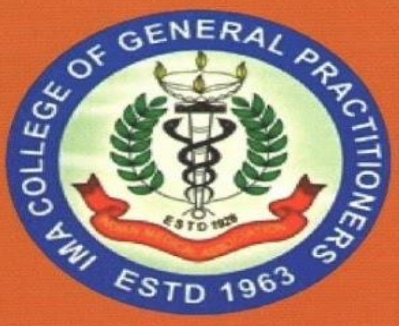

the FAMILY DOCTOR

THE OFFICIAL JOURNAL OF IMA COLLEGE OF GENERAL PRACTITIONERS

APRIL 2022

Content

From the Dean's Desk

It gives me immense pleasure to present this 3rd issue of FAMILY DOCTOR - the online journal of IMA CGP at National Level. I am sure it will give you a tasty feast of knowledge, required in the family practice.

The article by Dr. J.A. Jayalal updating our understanding on the mesh used for various purposes in surgery and treatment will astonish you by the novel facts it contains. The importance of water in our health stressed by Dr. R. Anburajan is a marvelous output of a well read, ably studied family doctor deeply immersed in the clinical practice. The articles by Dr. S. Jamuna on FNAC, Dr. N.T. Ravi on DRESS syndrome, Dr. M.K. Sudhakar on Pneumococcal vaccines, Dr. T.N. Ravisankar on Life Certificate are worth reading again and again and preserve in our memories.

We are thankful to all these brilliant writers for adding this precious educational experience. We are thankful to Dr.T. N. Ravisankar and TEAM IMA CGP (HQs) for taking tremendous efforts to make all the issues of the Family Doctor as collectible items for the Family Doctors all over India.

I hereby appeal once again, to all the stalwart writers in IMA pan India, to contribute your academic articles for the FAMILY DOCTOR journal and let this sacred flow of knowledge be continued with every issue in future.

Dr. Avinash Bhondwe,
Dean, IMA CGP (HQs)

A Primer on Trigeminal Neuralgia for Family Physicians

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Introduction

Trigeminal neuralgia (TN) is characterised by recurrent, unilateral, brief (<1 s–2 min), excruciatingly painful, electric shock-like episodes of pain in the trigeminal distribution. They are abrupt in onset and termination, with a refractory period. It is a very disabling condition, that affects basic activities of daily living and quality of life. Despite its low incidence, TN is one of the more frequently seen neuralgias in the elderly population. The incidence increases gradually with age; most idiopathic and classic TN cases begin after age 50, although onset may occur in the second and third decades or, rarely, in children Prevalence of anxiety and depression, and risk of suicide is higher in these patients. This short review highlights the importance of prompt diagnosis, investigations, and treatment with focus on the salient aspects useful in day-to-day practice for family practitioners.

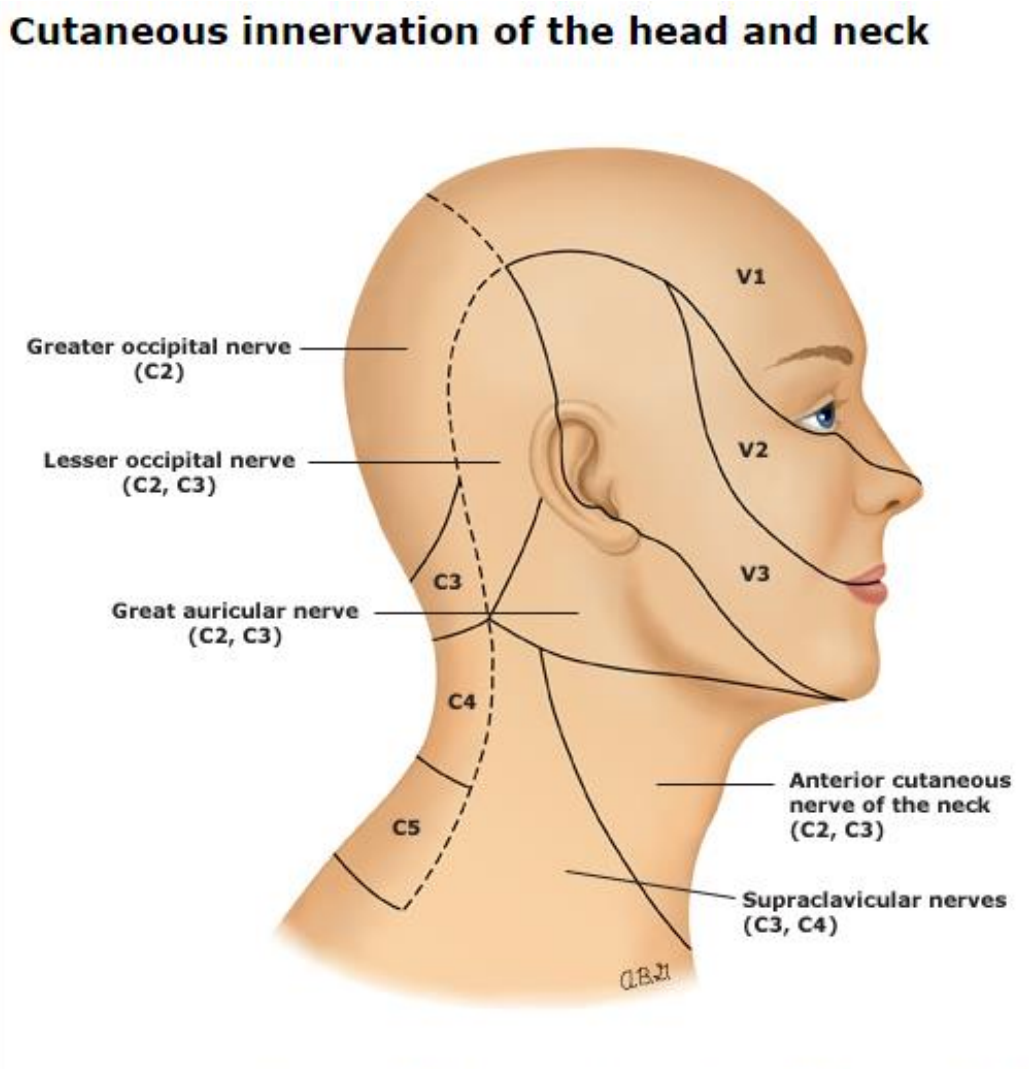
Section 1: Diagnosis

Clinical Features

- The pain most often involves the V2 and/or V3 subdivisions of the trigeminal nerve. Isolated involvement of the V1 subdivision occurs in <5 percent of patients with TN.
- **Paroxysmal pain** - The pain of TN tends to occur in paroxysms and is maximal at or near onset. Some patients with longstanding TN may have continuous dull pain that is present between paroxysms of pain.
- **Unilateral** – TN is typically unilateral. Bilateral involvement may occur in patients with TN caused by multiple sclerosis.
- **Trigger zones** – Nearly all patients with TN experience triggered pain. Trigger zones in the distribution of the affected nerve are common and are often located near the midline. Trigger zones can sometimes be demonstrated on physical examination. Other

triggers of TN paroxysms include chewing, talking, brushing teeth, cold air, smiling, and/or grimacing.

- **Autonomic symptoms** – Autonomic symptoms, usually mild or moderate, can occur in association with attacks of TN in the V1 trigeminal distribution, including lacrimation, conjunctival injection, and rhinorrhea.

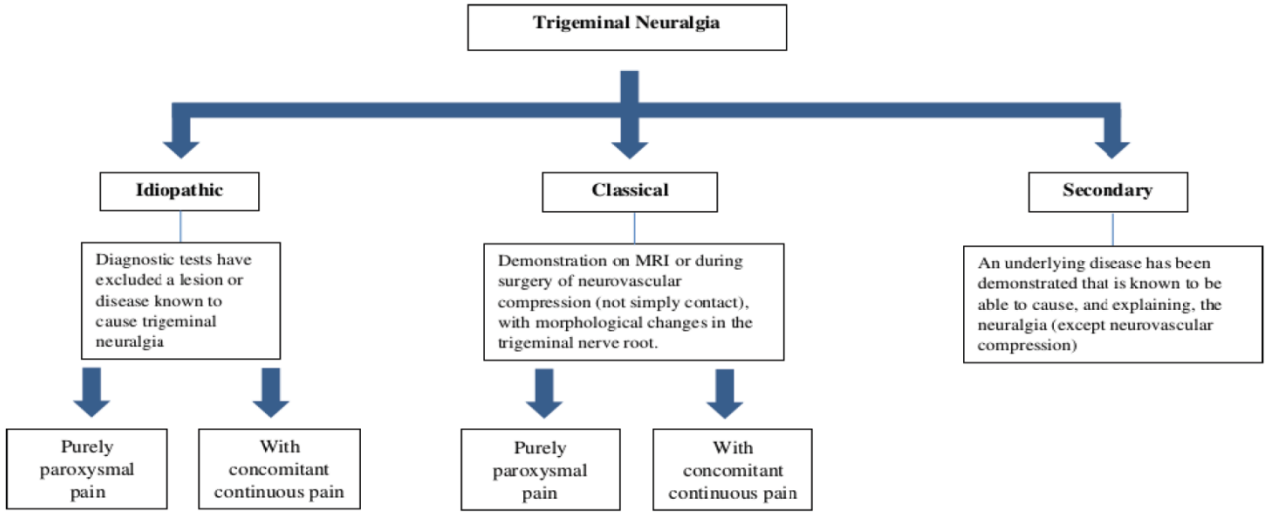


The sensory distribution of the trigeminal nerve (cranial nerve V) and its three divisions (V1, V2, V3) is shown along with branches of the cervical spinal nerves that innervate cutaneous regions of the head and neck.

Differential Diagnosis of TN

Dental Causes	Dental Caries
	Pulpitis
	Dental Sensitivity
	Periodontal Disorders
	Pericoronitis
	Cracked Tooth
	Alveolar Osteitis
Sinus Causes	Maxillary Sinusitis
Salivary gland Causes	Salivary Stone
TM Joint Causes	Temporomandibular Disorders
Neuropathic Pain	Glossopharyngeal neuralgia
	Nervus intermedius neuralgia
	Post-herpetic neuralgia
	Post-traumatic neuralgia
	Atypical odontalgia
	Burning Mouth syndrome
Trigeminal Autonomic Cephalgias	SUNCT/SUNA
	Paroxysmal Hemicrania
	Cluster Headache
	Hemicrania continua
Other	Persistent idiopathic facial pain
	Primary stabbing headache

Types of Trigeminal Neuralgia



Key Points for Clinical Diagnosis

- The diagnosis of TN may require a multidisciplinary team approach.
- The diagnosis of facial pain is almost exclusively reliant on the pain history, hence time should be taken to actively listen to the patient's narrative.
- In the primary care setting, it is reasonable to expect a GP to initiate medical treatment based on clinical suspicion, and concomitantly refer to a specialist service for a definitive diagnosis, investigations, and further management.
- 'Red flags' that necessitates a more urgent referral to specialist services include: sensory or motor deficits, deafness or other ear problems, vision loss, history of malignancy, bilateral TN pain, systemic symptoms (eg fever, weight loss) and, a younger age of presentation.

Investigations

- The aim of imaging is to identify any underlying pathology and determine if there is a neurovascular compression (NVC).
- MRI is recommended to confirm the clinical diagnosis and for confirmation of the type of TN.
- TN imaging should be conducted in a specialist setting. The reporting of TN imaging should be conducted by a radiologist with a special interest/training in TN, and the radiologist, ideally, should be 'blinded' to the side of the pain.
- Magnetic resonance (MR) imaging of the posterior cranial fossa with combination of two high-resolution sequences: *3D T2-weighted, 3D TOF-MRA*; with a standard screening of the other regions of the brain; routinely, a non-contrast study is enough.
- Computed tomography (CT) is done only if an MRI is contraindicated, and neurophysiological testing is unavailable to identify underlying pathology.

Section 2: Pharmacological treatment

The medications used for TN must be taken on a regular basis to maximise their effect. However, once a remission period is noted (no pain for at least 4 weeks), then the medication can be slowly tapered down and stopped. Should there then be a recurrence of pain the medication should be restarted and gradually escalated upwards to the lowest effective dosage. Some patients are so fearful of a return of pain that they may reduce dosage, but do not fully stop their medications.

First line medications (GPs and specialists can prescribe):

- **Carbamazepine (CBZ)** - therapeutic range is normally between 800mg – 1200mg total daily dose split over 2-4 separated doses. Sustained release formulation is available, but it should be avoided until a maintenance dose is achieved.

- **Oxcarbazepine (OXCB)** – alternative should there be medication interaction issues with carbamazepine. Therapeutic range is normally between 1200mg – 1800mg total daily dose split over 2 separated doses. Consider monitoring of plasma sodium concentration in patients at risk of hyponatraemia (hyponatraemia tends to be dose related).

Alternative or adjuvant medications (specialists only to initiate; GP can offer on repeat prescription): Should a medication be ineffective, then another adjuvant medication may be added; however, there is no evidence of superiority, as compared to CBZ/OXCB, but some evidence of better tolerability.

- **Lamotrigine (LTG)** - can be used in combination with CBZ/OXCB (potential interaction - lamotrigine may increase the concentration of CBZ/OXCB and CBZ/OXCB decreases the concentration of LTG. LTG can also be used as a monotherapy. Recommend gradual dose escalation (25mg/week), up to a maximum of 200mg twice daily with monitoring for rash.
- **Baclofen** - can be used in combination with CBZ/OXCB. Therapeutic range is normally between 40-80mg total daily dose split over 2-3 separated doses. To monitor for sedation, ataxia and falls in the elderly.
- **Gabapentin** - can be used in combination with CBZ/OXCB or as monotherapy. Therapeutic range is normally between 900-3600mg total daily dose split over 3 separated doses
- **Pregabalin** - can be used in combination with CBZ/OXCB or as monotherapy. Recommend dose escalation up to maximum of 300mg twice daily.
- **Botulinum toxin type A** - there is weak evidence that botulinum toxin may reduce pain intensity when used alongside other systemic drugs. Due to the delayed onset of action, botulinum toxin type-A should only be considered for the medium-term management of TN. Adverse effects were mild to moderate and included transient facial weakness and transient facial oedema.
- **Vixotrigine -** A novel sodium channel blocker that has been found effective (not available commercially in India).
- **Opiates** are ineffective in TN, and they should be avoided.
- **Anti-Depressants (Amitryptilline, Nortryptilline and Duloxetine),** although affective, are usually indicated if only if there is co-morbid depression.

Acute Adjuvant medications: The previously listed anticonvulsants may take several days to take full effect; therefore, the addition of a quicker acting adjuvant treatment can be

considered while the anticonvulsant takes effect. These options should be offered under supervision of a specialist.

- **Lidocaine** - can be used acutely as an adjuvant to systemic medications should there be a defined 'trigger point'. Lidocaine 10mg per actuation nasal spray – 2 sprays into the nostril on the affected side (when pain is maxillary) as required. Lidocaine 5% ointment – applied directly to trigger point on face or inside mouth as required. **Lidocaine infusion** – 1.5mg/kg intravenous infusion over 1 hour (hospital admission with full monitoring. Previously 5mg/kg dosage was used, but recent data about efficacy of a lower dosage exists.
- **Fosphenytoin** – 15mg/kg intravenous infusion over 30 minutes (hospital admission with full monitoring).
- **Phenytoin** – 10mg/kg intravenous infusion over 45-60 minutes (hospital admission with full monitoring).
- **Subcutaneous Sumatriptan** is another option, but it is not available in India.

Section 3: Surgical treatment

Owing to the irreversible nature and potential risks of surgery, it is vital that prior to embarking/offering surgical management, all patients are referred to a specialist. The available evidence suggests that approximately 25-40% of patients will opt for neurosurgery within 2 years of referral to specialist centres. There is no evidence to determine the best timing of surgery in the management of TN. However, surgery may offer the best long-term pain control outcome for many TN patients.

Potential criteria for referring a patient for Surgical Management include:

- the use of a wide range of medications with reduced efficacy,
- poor tolerability of medicines, or
- significant negative impact of the condition upon quality of life.

It is **strongly recommended** that microvascular decompression (MVD) is employed ahead of stereotactic radiosurgery in TN patients with a neurovascular compression, who are willing and fit enough to undergo posterior fossa surgery. Similarly, a **weak recommendation** is given that MVD could be considered preferentially over neuroablative treatments, particularly if a definite neurovascular compression is present.

Types of surgical interventions

Microvascular decompression (MVD)

- It should be considered in those patients with neurovascular compression on imaging, and who are fit to undergo a general anaesthetic.

- MVD has a mortality of 0.1%, can be associated with stroke, CSF leak, and a less than 5% risk of ipsilateral hearing loss.
- Furthermore, an uneventful MVD on average involves a 4-day inpatient stay.
- Some neurosurgeons will carry out internal neurolysis ('nerve combing') - if no vascular compression is found at the time of the surgery, it carries a higher risk of post-op sensory loss or anaesthesia dolorosa.

Percutaneous neuroablative procedures at the Gasserian ganglion level

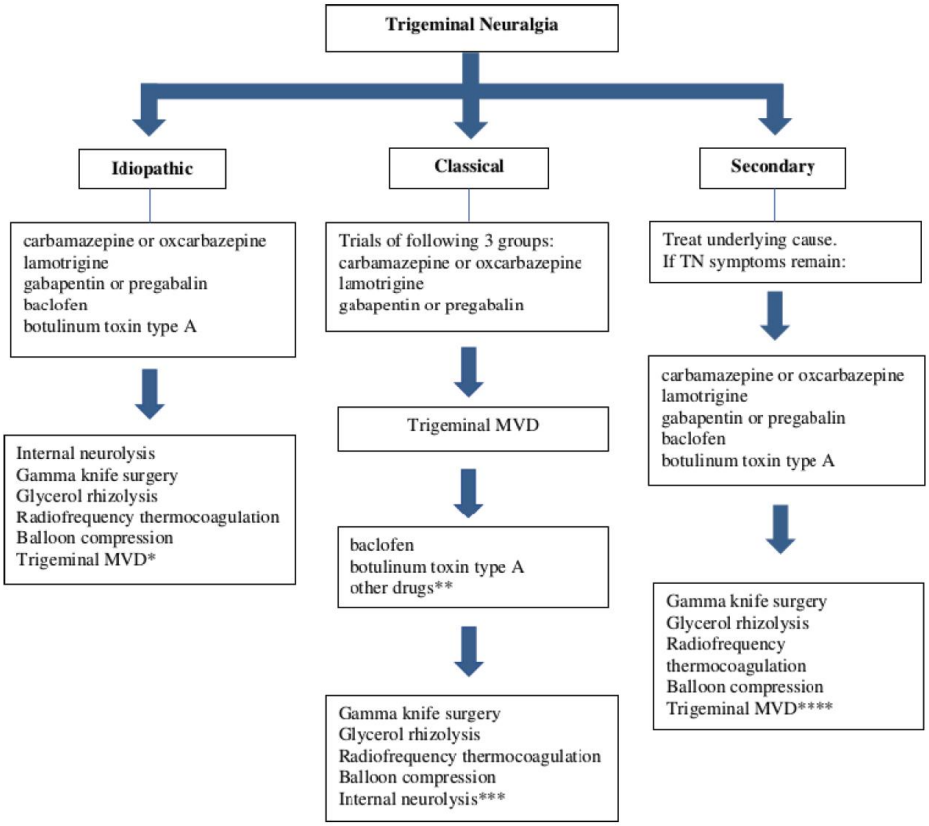
- The procedures includes radiofrequency thermocoagulation (RFT), balloon compression (BC), and glycerol rhizolysis(GR).
- These procedures are performed under general anaesthesia with imaging guidance, and usually involve an overnight stay.
- Since they are ablative procedures (involve a degree of damage to the nerve), they very often will result in a change in facial and corneal sensation.
- Neuroablative treatments should be the preferred surgical intervention if MR imaging does not demonstrate any neurovascular compression and medical management is insufficient.

Stereotactic Radiosurgery (SRS)

- SRS is a minimally invasive neuromodulative single session procedure, utilising focussed radiation which targets the trigeminal nerve with high precision.
- The pain-relieving effects of this treatment are not immediate (different to the ablative surgical procedures); the time to pain relief is typically between 1 and 3 months.
- Pain recurrence is more frequent following SRS than after MVD, and SRS has a minor risk of side effects eg numbness, reduced blink reflex, dry eye and, rarely, anaesthesia dolorosa.
- Access and cost of procedure remains an issue as very few centres across the country offer it.

Peripheral procedures

- These procedures involve treating the terminal branches of the trigeminal nerve, and hence depend on accurate assessment of which nerve branch is acting as the trigger.
- The relevant nerve branch can then either be injected with alcohol, or surgically exposed and treated with cryotherapy or neurectomy.
- Most of these peripheral procedures can be carried out under local anaesthesia and do not require the patients to be medically fit for surgery.
- Recurrence of pain and anaesthesia dolorosa remain an issue.



Summary of approach to management of TN

Non-Pharmacological Measures

It is important to take into consideration that patients with TN suffer not only from severe pain but also from other factors such as depression and anxiety. It is recommended that patients are offered psychological and nursing support. Patients should be directed to national support groups where these are present.

Prognosis

The course of TN is usually laden with recurrences and remissions. The majority have periods of remission with no pain lasting months or years but in some, TN becomes more severe and unresponsive to medical treatment over time. Most patients with TN are initially managed medically, but almost half of patients eventually require surgical intervention.
procedure.

Key Messages and Summary

- Trigeminal neuralgia is currently classified into three subgroups: idiopathic, classical, and secondary, based on imaging findings; MR brain imaging with trigeminal sequences is therefore essential in the diagnostic work-up.
- An accurate diagnosis is vital because the management differs among the various forms of facial pain.
- Carbamazepine and oxcarbazepine remain the medications of choice; lamotrigine, gabapentin, pregabalin, botulinum toxin type A and baclofen can be used as second-line treatments in monotherapy or polytherapy.
- In drug-resistant cases, trigeminal microvascular decompression is the first-line surgery in patients with classical trigeminal neuralgia, whereas neuroablative surgical treatments and microvascular decompression can be considered in idiopathic trigeminal neuralgia.
- Drug-resistant cases as well as cases where diagnosis is unclear should be referred to multidisciplinary teams led by neurologists specialising in headache disorders.

References

1. Guidelines for the management of trigeminal neuralgia 2021.; Royal College of Surgeons UK
2. Bendtsen L, Zakrzewska JM, Abbott J, Braschinsky M, di Stefano G, Donnet A, et al. European Academy of Neurology guideline on trigeminal neuralgia. Vol. 26, European Journal of Neurology. Blackwell Publishing Ltd; 2019. p. 831–49.
3. AAN Summary of Evidence-based Guideline for CLINICIANS TRIGEMINAL NEURALGIA [Internet]. Available from: www.aan.com
4. Lambru G, Zakrzewska J, Matharu M. Trigeminal neuralgia: A practical guide. Vol. 21, Practical Neurology. BMJ Publishing Group; 2021. p. 392–402.
5. Trigeminal Neuralgia Review Article, Uptodate.com

National Tuberculosis Elimination Program – NTEP

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Tuberculosis

Tuberculosis is specific infectious disease caused by Mycobacterium Tuberculosis. Pulmonary TB occurs in the lungs – 85% of all TB cases are pulmonary. Extrapulmonary TB occurs in places other than the lungs, including the Lymph nodes, Pleura (membrane surrounding each lung), Brain and spine, Kidneys, Bones and joints. Miliary TB occurs when tubercle bacilli enter the bloodstream and are carried to all parts of the body**.**

Global TB Burden – 2020

The incidence of TB globally is 99,60,000 (130/lakh) and in India it is 26,40,000 (193/lakh).The estimated death rate due to TB excluding HIV globally is 12,10,000 (16/lakh) and in India it is 445000(31/lakh).The MDR/RR cases globally is around 4,65,000 (6.1/lakh) and in India it is around 1,24,000 (9.1/lakh). The HIV TB cases globally is 8,15,000(8.2/lakh) and in India it is 71,000(6.4/lakh). The deaths due to HIV TB is 2,08,000 (2.7/lakh)globally and in India 9,500(0.79/lakh).

India contributes to about 27% of all TB cases, 24% of MDR/RR cases and 32% of TB deaths globally.

End TB Strategy

To achieve 80% reduction in TB incidence as compared to 2015. To achieve 90% reduction in TB deaths as compared to 2015. 0% percentage of TB-affected households facing catastrophic costs due to TB.

Source of infection

Human source –Human case is the most common source of infection. TB spreads through the air when infectious people cough, spit, talk or sneeze(Droplet infection & droplet nuclei).
Bovine source – Through infected milk, but rare.

Case finding - case definition of presumptive TB

Case definition of Presumptive TB is based on clinically diagnosed cases and microbiologically confirmed. Based on anatomical site presumptive TB is divided into pulmonary and extrapulmonary. Based on history of ATT it is divided into new, recurrent, treatment after failure , treatment after lost to follow up, other previously treated.

Clinically diagnosed TB case

Refers to presumptive TB patient who is not microbiologically confirmed, but has been diagnosed with active TB by a clinician on the basis of X-ray abnormalities, histopathology or clinical signs with a decision to treat the patient with a full course of anti-TB treatment.

Microbiologically confirmed TB case

Refers to presumptive TB patient with biological specimen positive for AFB, or positive for Mycobacterium tuberculosis on culture, or positive for tuberculosis through Quality Assured Rapid Diagnostic molecular tests.

Based on anatomical site of disease

Pulmonary TB : Refers to any microbiologically confirmed or clinically diagnosed case of TB involving the lung parenchyma or the tracheobronchial tree.

Extra-pulmonary TB : Refers to any microbiologically confirmed or clinically diagnosed case of TB involving organs other than the lungs such as pleura, lymph nodes, intestines, genito-urinary tract, joint and bones, meninges of the brain etc.

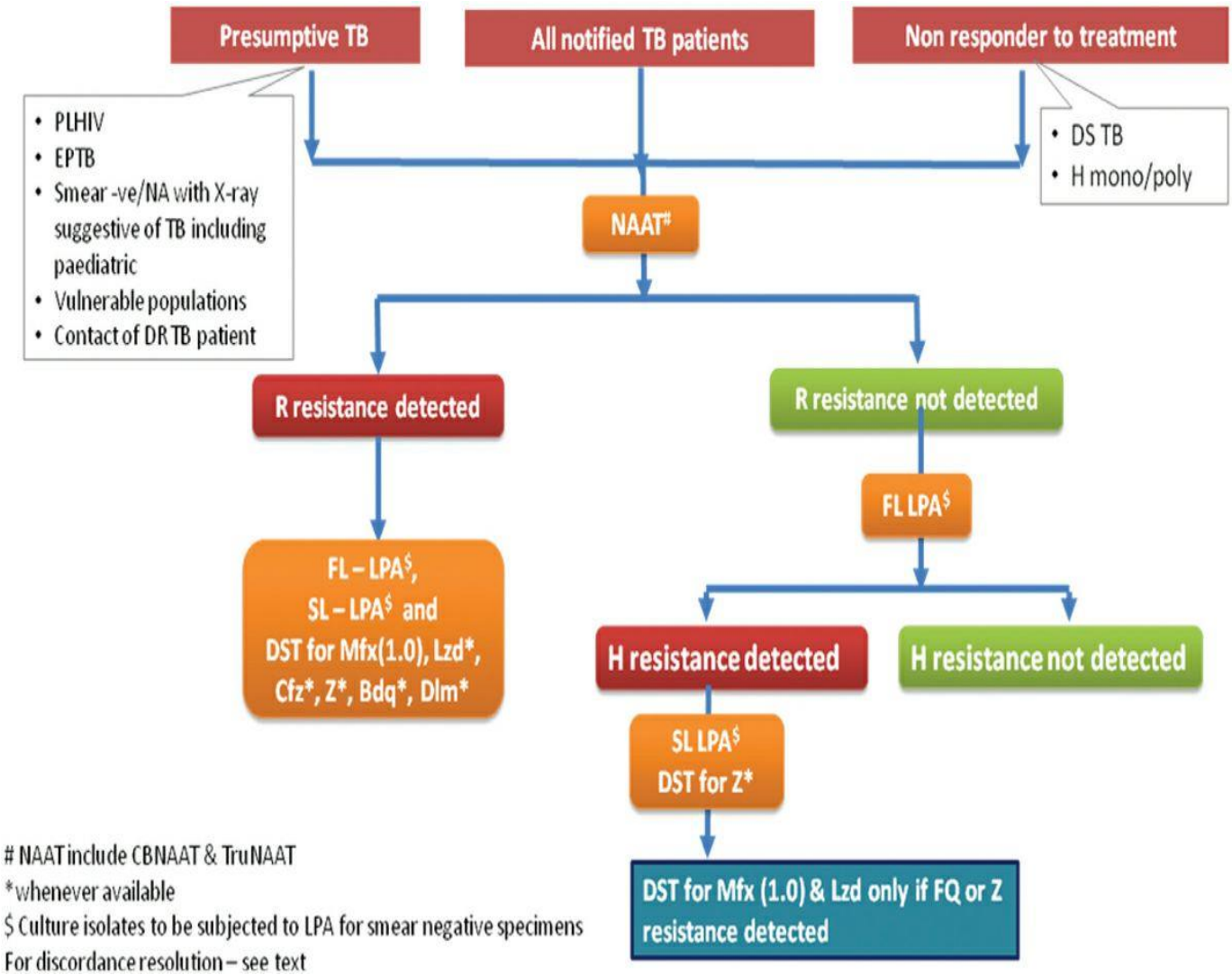
Presumptive Pulmonary TB

A person with any of the symptoms and signs s/o TB including Cough > 2 weeks, Fever > 2 weeks, Significant weight loss, Haemoptysis. Any abnormality in chest radiograph.

Presumptive Extra Pulmonary TB

Refers to the presence of organ specific and symptoms signs like swelling of lymph node , pain and swelling symptoms disorientation, etc and/or constitutional symptoms like significant weight loss, persistent fever ≥ 2 weeks, night sweats.

Diagnostic protocol



Diagnostic Tools

Tools for microbiological confirmation of TB All efforts should be undertaken for microbiologically confirming the diagnosis in presumptive TB patients. Under RNTCP, acceptable methods for microbiological diagnosis of TB are:

Sputum smear microscopy (for AFB):

Ziehl-Neelsen staining :Mycobacterium tubercle which is a Acid fast organisms appear red against a blue background. Acid fastness is based on the cell wall. Beaded or barred forms are frequently seen with Mycobacterium Tuberculosis while Mycobacterium bovis stain more uniformly.

Fluorescent staining

LED fluorescent microscopy : More sensitive than ZN. Needs more than 1000 bacilli per ml of sputum. It has dual Mode – both bright field and Fluorescent option**.**

Rapid molecular diagnostic testing :

CBNAAT: Uses Molecular beacons RT PCR. No bio-safety cabinet required. Closed system hence no risk of contamination. It is specific for MTB, sensitivity close to culture. Detection of Rifampicin-resistance via rpoB gene.

Line probe assay: A DNA based identification of tuberculosis and the most common genetic mutations causing resistance to rifampicin, isoniazid, fluoroquinolones and second line injectable. Can diagnose MDR-TB directly from smear-positive sputum samples. Resistance targets are rpoB for RIF, Kat G and inhA for INH. Resistance targets are gyrA, gyrB for FLQ and rrs for SLI.

Xpert MTb/RIF assay

Culture :

Solid(LJ) media : Conventional LJ , Agar etc are used. It requires 2-8 weeks for detection, 8-12 weeks for DST . Biosaftey is required and this method is “gold standard”.

Liquid culture system : Available initially as in-house – 7H9, Kirschners medium etc. More reliable system for DST. This method is Expensive and need for negative pressure environment system and chances of contamination is high.

MGIT 960 System: Consists of 7 ml of Middlebrook 7H9 broth with an oxygen sensitive dye at the bottom of the tube which fluoresces on depletion on the growth of microorganism**.** Positivity occurs from 4-21 days (7-14 days), DST – 4-7 days, Earliest DST possible from 21-28 days, Manual version also available, Capacity – 8-10,000 annually.

Extra-pulmonary TB few observations

CBNAAT is preferred over other tests. Sensitivity of CBNAAT is high in FNAC/Bx from lymph nodes, Bx from other tissues and CSF; lower in pericardial, ascitic and synovial fluid sample and still lower in pleural fluid. A positive CBNAAT result provides useful confirmation but a negative test does not always rule out TB. Tissues to be tested by CBNAAT should be collected without formalin**.**

Collection of biological specimen for microscopy

Two samples are collected within a day or on two consecutive days. The sputum containers should be labelled properly by writing the patient's laboratory serial number on the side of the sputum container**.** Sputum should be at least 2ml in quantity and preferably mucopurulent**.** From the sputum sample a smear is made, fixed and stained using ZN or FM.

Collection of extrapulmonary specimens Biopsies:

Should be collected aseptically using surgical procedures in sterile containers without preservatives or fixatives. Sterile saline / liquid medium may be added to prevent drying up of the specimen. Collection of samples using specific procedures aid in accurate removal of tissue fragments from suspect lesions. Pleural biopsy – direct inoculation. Peritoneum, liver – using laparoscopy, Skin – skin biopsy, Renal biopsy – USG guided, Reproductive organs – endometrium by curettage, Abdominal – Mesenteric biopsy.

Brain Teasers: Interactive Quiz with points for clinical Practice

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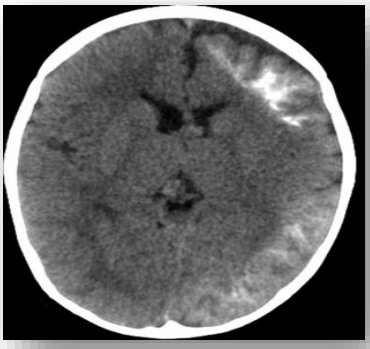
1. **Here is a patient with CT brain coming to your clinic and gives this classical story. Can you make the diagnosis?**



Dear sir, if you could not diagnose with this CT scan of brain then listen to my story, as this might help you.

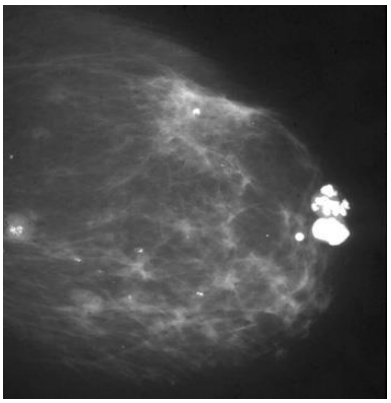
I am a 20-year-old man now and since birth I was having seizure episodes. I was a below average student at school and used to sit at the last row of my class. Basically, I am a shy man and like to stay isolated because I am worried whether people might make fun of me seeing my face having a large ugly birthmark on the left side of forehead and eye. When I went to consult my eye surgeon, she told I have pressure in the eye and better see a neurologist also.

As soon as I met a neurologist, he promptly ordered a CT scan brain and told me that I suffer from a syndrome associated with port wine stain of face, glaucoma, seizure and mental retardation and ipsilateral leptomeningeal angioma seen as rail track like calcification.

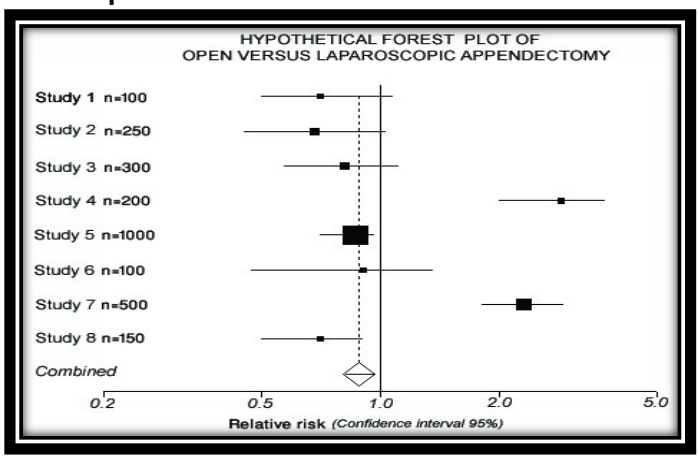
Hope you have got the final diagnosis now?!

2. **This barium swallow was done in a patient with progressive dysphagia for solids and weight loss. Can you name the sign and give your diagnosis?**

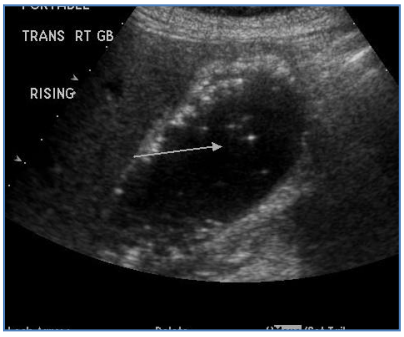
3. **This 60-year lady had a screening mammogram and has come to you for second opinion. How best can you describe the calcifications in the breast?**



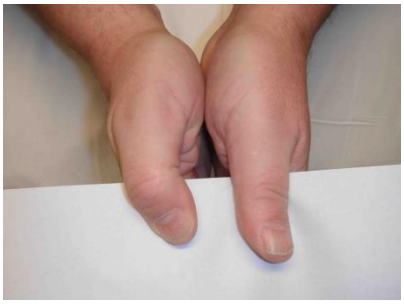
4. **In meta-analysis and systematic reviews, we find several of the following chart shown depicting the data for easy comprehension. Can you give the name for such charts and their importance?**



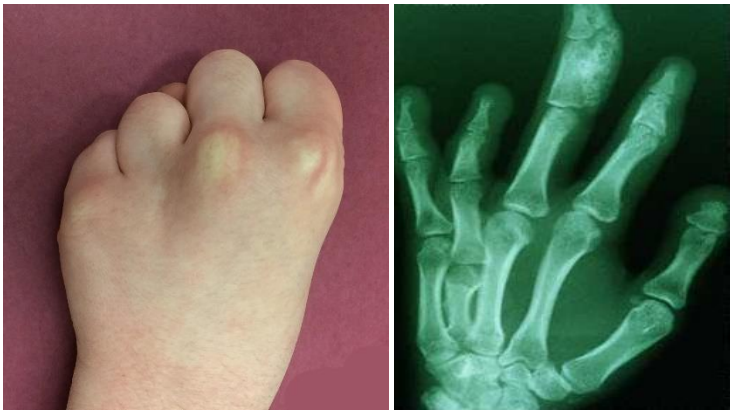
5. **Here is the Ultrasound abdomen imaging of a lady presenting with pain RUQ with Murphy's sign. Can you name the classical sign seen in this film?**



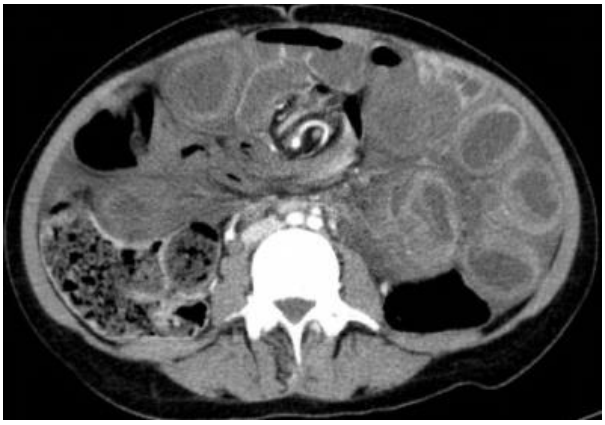
6. **Here is a demonstration of bed side test to evaluate for upper limb nerve injury. Name the classical sign and the reason for the disability.**



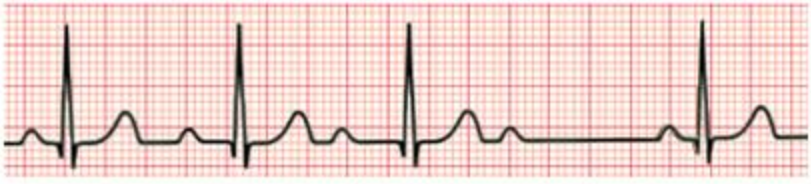
7. **Look at the patient's hand and corresponding x ray of the hand.**
   Can you make the diagnosis?



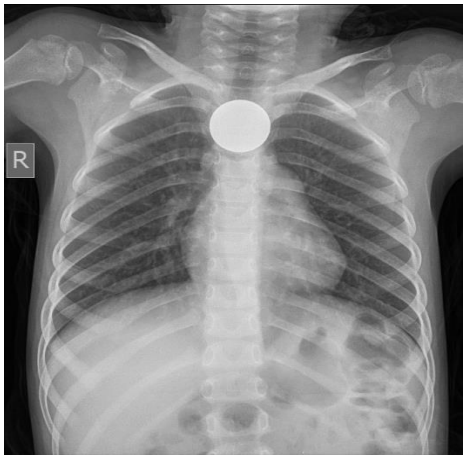
8. **20-year man presented with pain abdomen, vomiting and abdominal distension and constipation. Clinical diagnosis was acute small bowel obstruction. CT abdomen was done which showed a classical sign and pressed the surgeon to action for a quick laparotomy. Name the sign and give your diagnosis.**



9. **Here is a patient with history of recurrent giddiness whose ECG is shown here. Can you give your diagnosis?**



10. **Child with FB sensation throat. X ray chest was taken. Your diagnosis and treatment.**



SUMMER AND HEAT STROKE

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Aarogya Hospital / Kailash Diagnostic & Rehab Centre

Summer is the hottest of the Earth's four temperate seasons that goes after spring and foreshadows autumn. A 'meteorological season' is defined as the 12 months of the year being divided up into four seasons. There is another definition for summer, though. When the seasons are based on the Earth's position in relation to the sun, it is called 'astronomical summer'.

Weather in the summer grows warmer, and in some areas, the heat translates to drier temperatures. In this time of the year, days become warm, hot and really long, while nights in this season are short and humid. This season brings us the hotness of sun because the part of earth is facing straight rays of sun. Temperatures over the period differ based upon the location on the Earth; regions near the equator are typically warmer than those lying near the poles. This is because, due to the curve of the Earth, these places receive the most sunlight. Heat waves, times of excessively hot weather that include spikes in temperature, can also occur during the summer.

Summer is an essential season because warmth of the summer days creates lifelong conditions for animals and plants activities. This season helps the farmers to grow food crops. Sunlight helps to regulate almost all our bodily metabolic processes, as well as acting as psychological encouragement to improve our lifestyle. A few reasons why summer is great for our health include reduced rates of heart attacks in the summer, higher levels of Vitamin D, tendency to eat more seasonal fruit that in turn boosts the immune system, relief from skin complaints such as acne, psoriasis by controlled exposure to the sun's ultraviolet rays, increased agility, increased water consumption of water which is vital to thousands of chemical processes that take place in the body's cells to enable it to function and even help in regulation of sleep disorders.

However, the hot wind that blows during day time in summer can make us ill too. We begin to get perspiration. Many deaths during summer are caused by dehydration, especially during heat waves and therefore, staying hydrated is especially important when temperatures soar to avoid spectrum of 'Heat Stress - Heat Related Illnesses' such as Heat Rash, Heat Cramps, Heat Syncope, Rhabdomyolysis, Heat Exhaustion or Heat Stroke.

Heat related Illness is most likely to affect older people if there are stagnant atmospheric conditions and poor air quality. Other high-risk groups include people of any age who don't drink enough water, have chronic diseases, or who drink excessive amounts of alcohol. Heat stroke is strongly related to the 'heat index', which is a measurement of how hot you feel when the effects of relative humidity and air temperature are combined. A relative humidity of 60% or more hampers sweat evaporation, which hinders your body's ability to cool itself. The risk of heat-related illness dramatically increases when the heat index climbs to 90 degrees or more. Exposure to full sunshine can increase the reported heat index by 15 degrees. In what is known as the "heat island effect," asphalt and concrete store heat during the day and only gradually release it at night, resulting in higher nighttime temperatures. Other risk factors associated with heat-related illness include

- Age - Infants and children up to age 4, and adults over age 65, are particularly vulnerable because they adjust to heat more slowly than other people, because of impaired thermostat like function of Hypothalamus.
- Health conditions - heart, lung, or kidney disease, obesity or underweight, high blood pressure, diabetes, gout, mental illness, sickle cell trait, alcoholism, sunburn, and any conditions that cause fever
- Medications - including antihistamines, diet pills, diuretics, sedatives, tranquilizers, stimulants, anticonvulsants, heart and blood pressure medications such as beta-blockers and vasoconstrictors, and medications for psychiatric illnesses such as antidepressants and antipsychotics.

  Illegal drugs such as cocaine and methamphetamine also are associated with increased risk of heat stroke.

Heat stroke, the most serious heat-related illness, where body temperature rises to 104 F (40 C) or higher within 10 to 15 minutes, is caused by body overheating usually as a result of prolonged exposure to or physical exertion in high temperatures. Heat stroke often happens as a progression from milder heat-related illnesses such as heat cramps, heat syncope (fainting), and heat exhaustion, but it can strike even with no previous signs of heat injury.

It occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Heat Stroke is caused when the strong sun and hot blowing air heats the outer skin of the body excessively. This dilates the blood vessels, which increases blood circulation. The heated blood due to increased blood circulation also results in increase of the body temperature.

Heatstroke requires immediate medical attention to prevent permanent damage to the brain and other vital organs that can result in death or permanent disability if emergency treatment is not given. Symptoms of heat stroke include confusion, altered mental status, slurred speech, loss of consciousness, coma, hot & dry skin with no sweating or sometimes with profuse sweating, rapid heartbeat, seizures and very high body temperature. First Aid measures include moving the effected to a shaded, cool area and removing outer clothing, cooling quickly with a cold water bath if possible or at least placing wet and cool cloths on skin, or soaking clothing with cool water, to circulate the air around the person to speed cooling and placing cold wet clothes on neck, armpits, and groin, where major blood-vessels are superficial and thus facilitate heat exchange. Cooling by evaporation is the most effective method in the field under normal conditions. Severe heat stroke requires hospital treatment, especially if the person doesn't respond to the primary treatment within 30 minutes. Intra-Venous fluids, correction of electrolytes imbalance, medications **to stop shivering form the primary line of management.** For very severe cases of heatstroke, a device known as an endovascular cooler is inserted into the large blood vessel in the thigh, much like dialysis, to cool the blood, but this has to be done under strict medical supervision and at a specialized centre.

Heat exhaustion is the body’s response to an excessive loss of the water and salt, usually through excessive sweating. Persons most prone to heat exhaustion are those who are elderly, have high blood pressure, and those working in a hot environment. Symptoms of heat exhaustion include headache, nausea, dizziness, weakness, irritability, thirst, heavy sweating, elevated body temperature and decreased urine output. First Aid measures include shifting the person to a cool area and giving liquids to drink, removing unnecessary clothing, including shoes and socks, cooling the person with cold compresses or having the person wash head, face, and neck with cold water and encouraging frequent sips of cool water.

Rhabdomyolysis is a medical condition associated with heat stress and prolonged physical exertion, resulting in the rapid breakdown, rupture, and death of muscle. When muscle tissue dies, electrolytes and large proteins are released into the bloodstream that can cause irregular heart rhythms and seizures, and damage the kidneys. Symptoms of rhabdomyolysis include muscle cramps/pain, abnormally dark (tea or cola colored) urine, weakness, exercise

intolerance, but a few patients may remain asymptomatic. Persons suffering with symptoms of Rhabdomyolysis should stop activity, increase oral hydration (water preferred), seek immediate care at the nearest medical facility and shall be checked for indicators of rhabdomyolysis (blood sample analyzed for creatine kinase)

Heat syncope is a fainting (syncope) episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization. Symptoms of heat syncope include fainting of short duration, dizziness or light-headedness during prolonged standing or on suddenly rising from a sitting or lying position. Persons with heat syncope should sit or lie down in a cool place and slowly drink water, clear juice, or oral rehydration solution.

Heat cramps usually affect persons who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion. Symptoms usually are muscle cramps, pain, or spasms in the abdomen, arms, or legs. First Aid includes drinking water and having a snack and/or carbohydrate-electrolyte replacement liquid every 15 to 20 minutes. The effected person shall avoid salt and get medical help if the person has heart problems and is on a low sodium diet or if cramps do not subside within 1 hour.

Heat rash is a skin irritation caused by excessive sweating during hot, humid weather. Heat rash looks like red cluster of pimples or small blisters and usually appears on the neck, upper chest, groin, under the breasts, and in elbow creases. Persons experiencing heat rash should shift, when possible, to a cooler, less humid work environment, keep rash area dry, apply powder to increase comfort but ointments and creams should not be used.

The biggest challenge in summer is to keep ourselves safe. Taking a little care and making slight life style modifications may help us avoid Heat stress related illnesses. Keeping hydrated is the most important. Drinking plenty of fluids including water, coconut water, butter milk, lime-water and seasonal fruit juices is ideal, Tea, coffee, aerated and alcoholic drinks including beer in effect de-hydrate the body and shall be avoided. Light colored, lightweight, loose-fitting and breathable or airy natural fiber, such as cotton and linen, clothing is advisable. Using sunscreen with a sun protection factor (SPF) of 30 or more and rescheduling or cancelling outdoor activity If possible are other way of prevention from heat stress illness.

Role of Immunohistochemistry as an ancillary diagnostic technique to "Golden Standard Histopathology"

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Review article:

Title:

Role of Immunohistochemistry as an ancillary diagnostic technique to "Golden Standard Histopathology"

What is Immunohistochemistry?

The term Immunohistochemistry(IHC) is self-explanatory. Immuno means antigen antibody reaction and histo meaning tissue sections. The reaction between the tissue antigens with eccentric monoclonal antibodies which is visible under light microscopy.

Hence by definition, Immunohistochemistry is a method for detecting antigens in cells of a tissue section by binding of antibodies to antigens in biological tissues. There are various antigens in the cells. They can be in the cell membrane, cytoplasm or in the nucleus. Certain antigens are specific to the cell type. For example, thyroid specific antigen is specific to thyroid tissues. Hence if there is a metastatic deposit in the cervical node with undifferentiated morphology by histopathology, IHC will help in finding the diagnosis.

Let's look back at the evolution of IHC!

The technique of IHC dates back to 1941 when Albert Coons [1] developed immunofluorescence technique to detect antigens in the frozen sections. The current technique of IHC gained momentum only in 1990s where many technical developments in IHC led to standardization in technique. The discovery of Horseradish peroxidase by Avrameas, Nakane and Pierce [2] was a breakthrough in the technique. In today's era of automation, there are

automated IHC equipments which guarantee continuous quality of standardization, optimization and traceability of operations. However, in a developing country such as India, the cost of the assay is the major inhibitory factor hindering wide spread usage.

Basics of IHC:

The basic principle of IHC is a sharp visual localization of target components (antigens) in the cells and tissue while reducing nonspecific background staining.

There are 4 basic steps in IHC

1. Fixation – The tissue morphology has to be well preserved for IHC. As tissue specific antigens are very sensitive to lysis, proper fixation with 10% neutral buffer formalin is the first and foremost step for good IHC. It is imperative that the clinicians ensure adequate fixation of specimens soon after removal.

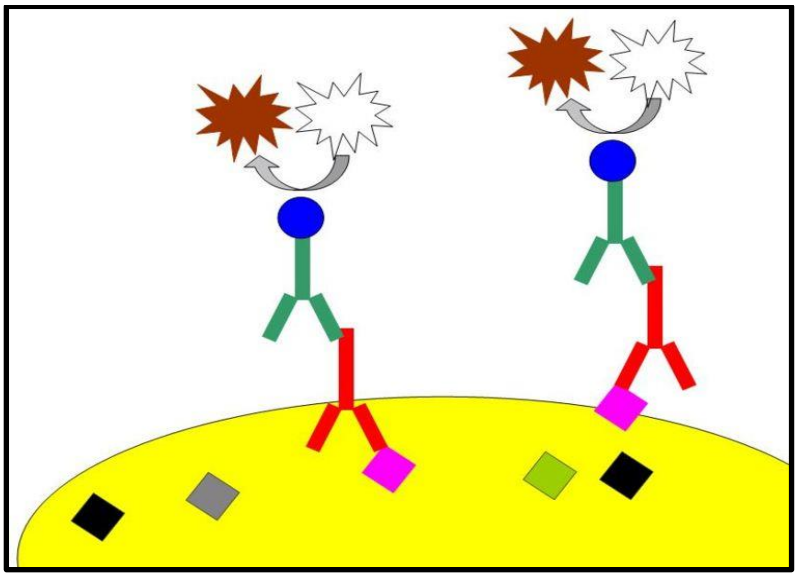
2. Antigen Retrieval – The antigens in the tissue sections are hidden and they have to be exposed for an enhanced binding with antibodies. Antigen retrieval is achieved by Heat induced epitope retrieval (HIER). Here the tissue slides are heated in a buffer solution using a pressure cooker or microwave.

3. Blocking –Normal tissues will have endogenous enzymes and endogenous antibodies. They should be blocked to prevent background staining. This is achieved by commercially available buffers which effectively blocks them.

4. Antibody labeling and staining:

As the antigen and antibody bind with each other, the binding can be enhanced by adding secondary antibody to the primary antibody. Later to make the binding visible, special stains such as DAB or AP red chromogens are used. Sometimes both are used for dual staining.

To simplify the steps, IHC technique is informally referred as “Hamburger technique” as the antigen and antibody are sandwiched.



(Picture 1: Basics of IHC – Pink – antigens, Red – Primary antibody, Green – Secondary antibody and Blue - Chromogen)

Clinical application of IHC:

1. Diagnosis of cancers of uncertain histogenesis

This is the most common application of IHC. In certain poorly differentiated cancers where the morphology is inconclusive, IHC helps in establishing the site of origin of the tumor. A panel of antibodies are chosen to establish the diagnosis. The most common antibodies used in primary panel are keratin, desmin, vimentin, neurofilaments and glial fibrillary acidic protein. The selection of antibodies should be based on the clinical history, radiological findings and histopathology findings.

2. Prognostic marker in cancer

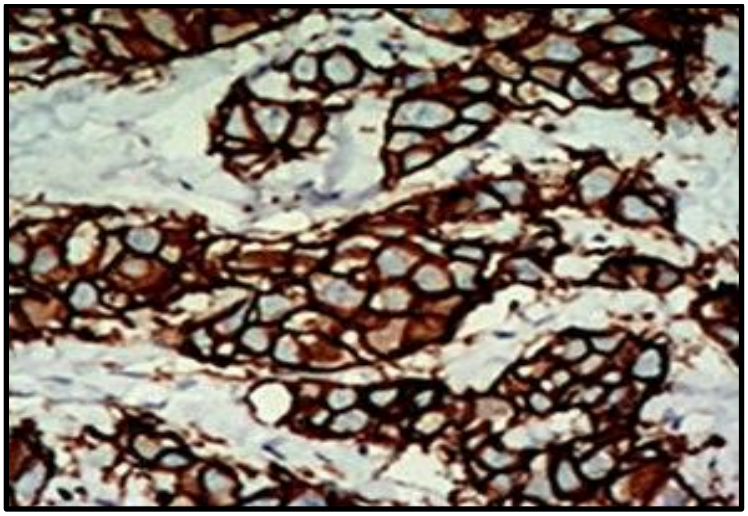
In certain cancers, the excessive expression or loss of a particular antigen indicates prognosis of the cancer. For example, in cancer of breast, loss of Estrogen, progesterone receptors and

HER2/neu are classified as “triple negative” cancers and indicates an aggressive behavior and chances of recurrence.

Ki67 is another valuable prognostic marker and increased expression indicates that the tumor is rapidly multiplying with increased mitosis. Hence increased Ki67 implies poor prognosis.

3. Predicting response to therapy

IHC is widely used in predicting the response to therapy in cancers of breast and prostate. These cancers are hormonally responsive as the growth of the cancer is dependent on estrogen and progesterone hormones. Tumors expressing high level of receptors would respond to neo-adjuvant endocrine therapy or surgical removal of the endogenous source of hormones. Bilateral orchidectomy will prevent the testosterone input to the growth of prostatic tumor. Selective Estrogen receptor modulators (SERMs) have revolutionized the breast cancer treatment.



(Picture 2: IHC in Breast Cancer – ER positive cancer cells are brown in color)

4. Infections

The application of IHC is not limited to the cancers alone. In viral infections such as cytomegalo virus, Hepatitis B and Hepatitis C virus, the detection of microbial DNA/ RNA is enabled by using IHC. Quantitative estimation of the microbial DNA/ RNA enables to know the viral load and plan the therapy.

IHC can also be used to detect organisms in body fluids. The most important application of IHC in detecting Pneumocystis from the sputum of immunocompromised patient is critical as it is imperative to start immediate and appropriate therapy.

What are the advantages of IHC?

- IHC is useful in making diagnosis in undifferentiated/ poorly differentiated cancers
- As prognostic and predictive markers
- To know the primary in metastatic tumors
- IHC can be used in fresh frozen tissues as well as in cytological preparations
- The stained slides can be archived for indefinite periods

Are there any limitations to IHC?

- Time consuming and expensive
- Limited availability of monoclonal antibodies
- Standardization of the technique is difficult
- Quantifying the results is difficult
- Trained technicians and skillful interpretation of the pathologist is vital
- IHC is only an aid to histopathology and can never be a substitute.

With automation, easy availability of monoclonal antibodies and increased prevalence of cancers, these limitations will be outdated in near future.

What is new in IHC?

IHC is being utilized in genetics research to identify specific gene products and their functions.

IHC is used in classification of neurodegenerative disorders [3] and to develop criteria for diagnosis and treatment.

IHC with beta amyloid precursor protein [4] has been proven as surrogate marker of axonal injury as early as 2 hours of injury

IHC is increasingly being used in muscular dystrophies to sub classify them and identify the specific muscle protein

Conclusion:

IHC has become an indispensable tool for pathologists in day today practice. We need to understand that IHC is only an ancillary test to the golden standard histopathology and it can never replace it. As always, a perfect correlation of the clinical, radiological and laboratory findings will definitely aid in the direction of diagnosis. Histopathology supplemented by IHC will give the final diagnosis.

References:

1. Coons AH. The beginnings of immunofluorescence. The Journal of Immunology. 1961 Nov 1;87(5):499-503.

2. Avrameas S. Amplification systems in immunoenzymatic techniques. Journal of immunological methods. 1992 Jun 24;150(1-2):23-32.

3. Kovacs GG. Molecular pathological classification of neurodegenerative diseases: turning towards precision medicine. International journal of molecular sciences. 2016 Feb;17(2):189.

4. Kousi C, Lampri E, Voulgaris S, Vougiouklakis T, Galani V, Mitselou A. Expression of orexin-A (hypocretin-A) in the hypothalamus after traumatic brain injury: A postmortem evaluation. Forensic science international. 2021 Oct 1;327:110961.

ECG for the Month

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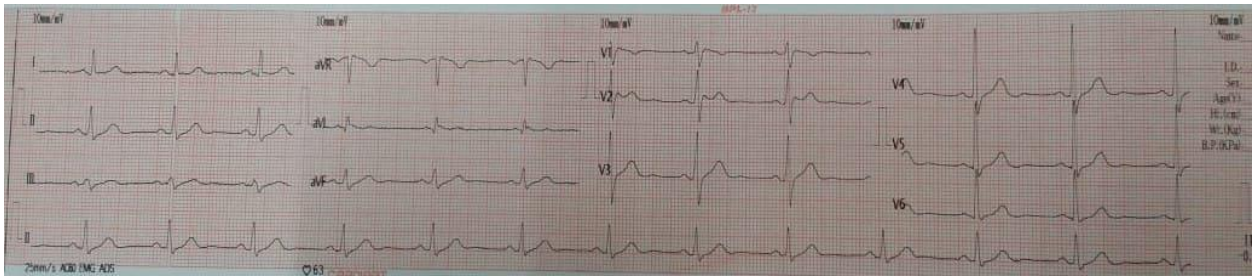

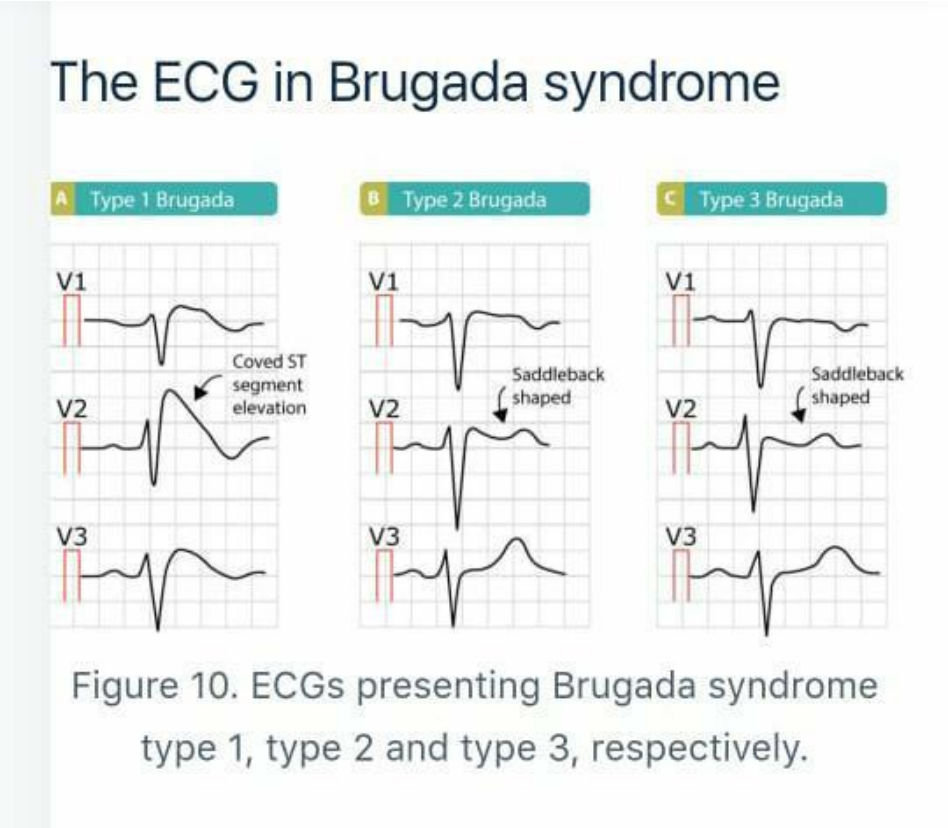

Figure 10. ECGs presenting Brugada syndrome type 1, type 2 and type 3, respectively.

Findings:

ST elevation only in V2
Saddle back ST elevation

Diagnosis:

Type 2 Brugada pattern ECG

Brugada Syndrome:

Brugada pattern ECG with one of the following clinical criteria -

1.Documented VF or VT

2.Family history of sudden cardiac death at <45 years old .

3.Coved-type ECGs in family members.

4.Inducibility of VT with programmed electrical stimulation .

5.Syncope.

6.Nocturnal agonal respiration.

Treatment:

Implantable cardioverter – defibrillator (ICD).

ECG patterns:

Type 1- coving ST
Type 2- saddle back ST
Type 3- coving or saddle back

Quiz Answers for - Brain Teasers: Interactive Quiz with points for Clinical Practice

1. Sturge Weber syndrome

2. Rat tail sign. Carcinoma esophagus

3. Pop corn calcifications due to benign breast disease

4. Forest Plot. It summarizes all the key information from various articles taken in the meta-analysis in an easy-to-understand single schematic diagram.

5. Champagne Glass sign due to acute emphysematous cholecystitis with floating air bubbles inside GB

6. Card test demonstrating Froment's sign. It is a classical sign of ulnar nerve palsy due to palsy of adductor pollicis muscle and over action of flexor pollicis longus.

7. Albright's syndrome or Dimple Dimple Knuckle Knuckle syndrome is due to short 4^{th} and 5^{th} metacarpals in case of pseudo hypoparathyroidism.

8. Whirl pool sign with dilated small bowel loops suggestive of small bowel volvulus with impending ischemia.

9. Mobitz type 1 or Wenckebach block. Type of AV block with prolonged PR intervals with subsequent drop of a QRS complex.

10. Coin in the esophagus. Coin seen as round object in the AP chest is classically seen only if the coin is located in the esophagus and not in the trachea! Endoscopic removal in presence of anesthetist is the standard of care. Coin in the trachea will be seen as vertical ridge in the AP chest x ray and patient will present with stridor!

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