Priyadharshini.R et al /J. Pharm. Sci. & Res. Vol. 8(6), 2016, 442-449

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

Cox2-Inhibitors in the Management of Pulpal Pain –A Review

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Abstract:

"Pain is an unpleasant sensation associated with actual or potential tissue damage and which has a large emotional component."Due to the common association of pain with tissue damage,it serves a protective function. There is evidence that the perception of pain & the emotional reaction to it are mediated by different brain mechanisms. Pulpal pain can be described by two ways it can be sharp, piercing, & lancinating usually associated with excitation of the A-delta nerve fibres in the pulp. And dull, boring ,gnawing ,& excruciating these associated with C nerve fibres in the pulp. And these type of pulpal pain is suppressed by analgesics. Most common analgesics used are NSAIDS. And these have high potential to relive the pulpal pain. NSAIDs have been used increasingly as analgesics, not just as anti-inflammatory agents,NSAIDs are effective for the management of any level of dental pain, whether mild, moderate or severe.Tissue damage such as pulpitis or periodontitis, or tissue damage resulting from surgery, will induce the production of COX-2, which, in turn, leads to the synthesis of the prostaglandins that sensitise pain fibres and promote inflammation. Traditional NSAIDs block both COX-1 and COX-2, but in recent years, new NSAIDs have been developed that are much more selective for COX-2. These selective COX-2 inhibitors were developed to be less damaging to the gastric mucosa, and the evidence supports this contention.

Keywords: Pulpal pain ,Analgesics, NSAIDs, Selective COX-2 inhibitors.

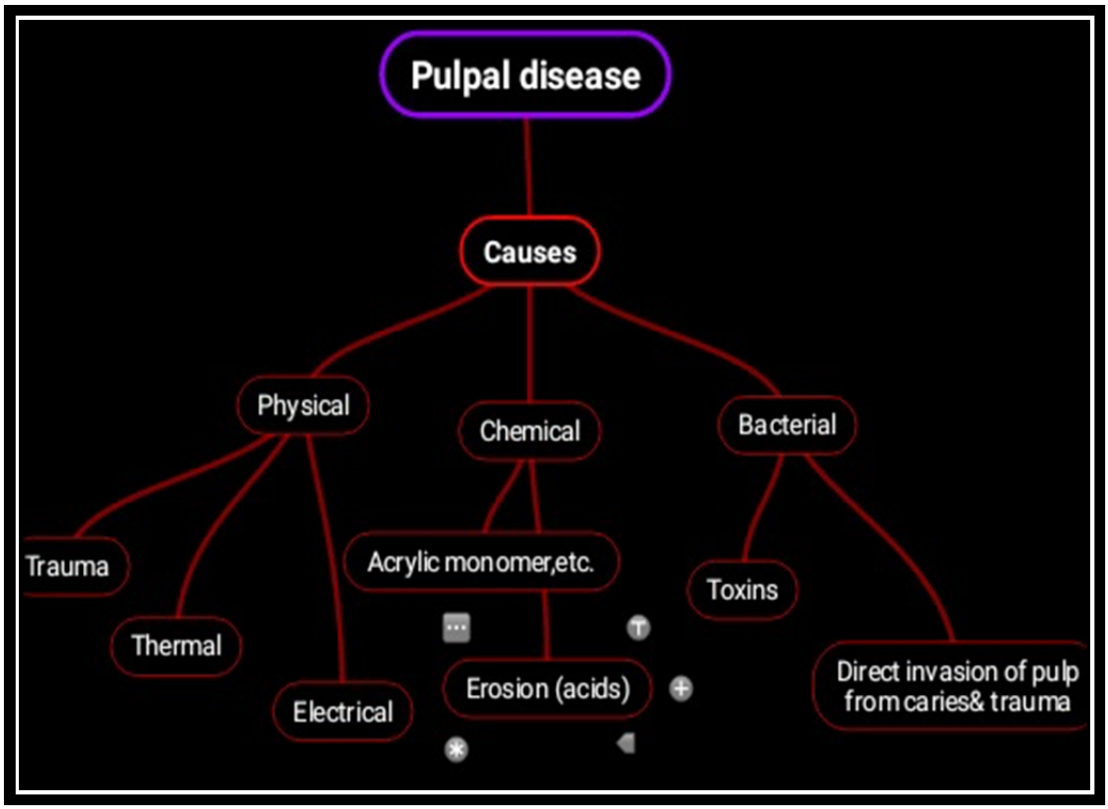
INTRODUCTION:

Pulpal pain can be cause due to physical, chemical,& bacterial . Pain is not a disease and it is always subjective. It is manifested, in addition to pain, as the activity of sympathicus, producing fear, anxiety,, pupilla-dilation, tears, tachycardia, hypertension, nausea, vomiting, sound effects, and facial expressions. The level of perception of pain is not constant: the threshold of pain and responses to pain vary under different conditions.It is exactly pain which is the most common reason for patients to come to the dental clinic; this pain usually originates in the tooth itself or its supporting structures. In order to establish a proper diagnosis, it is absolutely important to take anamnesis, i.e, a detailed subjective description of the painful condition of the patient, including the quality, volume, duration, frequency and periodicity of pain. Anamnesis is complemented by the clinical finding of the therapist, which consists of inspection, palpation, thermal testing, testing the pulp vitality, inspection of periodontium, percussion and taking of an X-ray. Odontogenic pain has its source in the pulpodentinal complex and/or periapical tissue.(1)NSAIDs are used as a analgesic & it has action of inhibition of prostaglandins synthesis by inhibition of the enzyme cyclooxygenasein arachidonic acid pathway. These prostaglandins are responsible for pain mechanism. Most NSAIDs inhibit cox-1 & cox-2 non-selective but now some new cox-2 selective inhibitors are introduced for effective management of pulpal pain. And beneficial action of NSAIDs are analgesia, antipyresis, anti-inflammatory ,anti-thrombotic. It has minimal adverse effects but not used for long term. This review article briefly described about pulpal pain management along with the effectiveness of COX-2 inhibitors .(2)

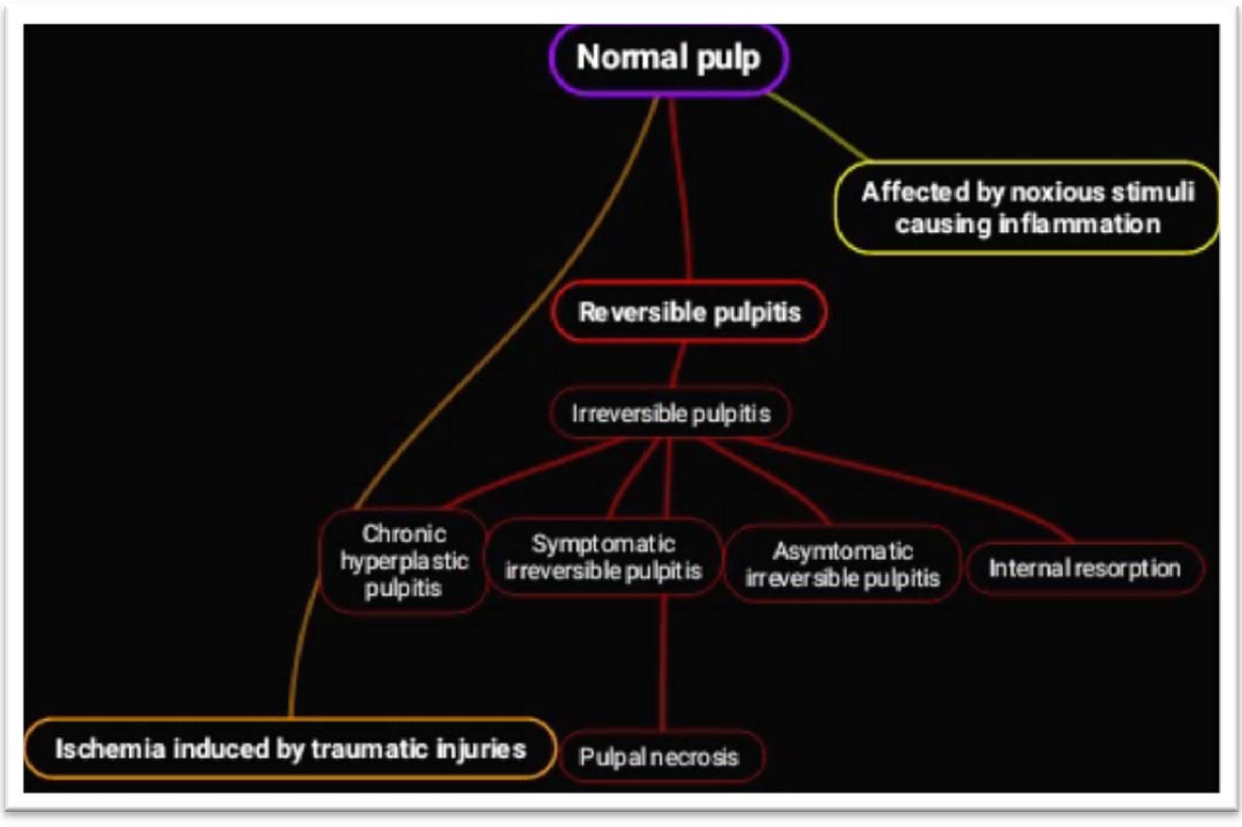
PULPAL DISEASES:

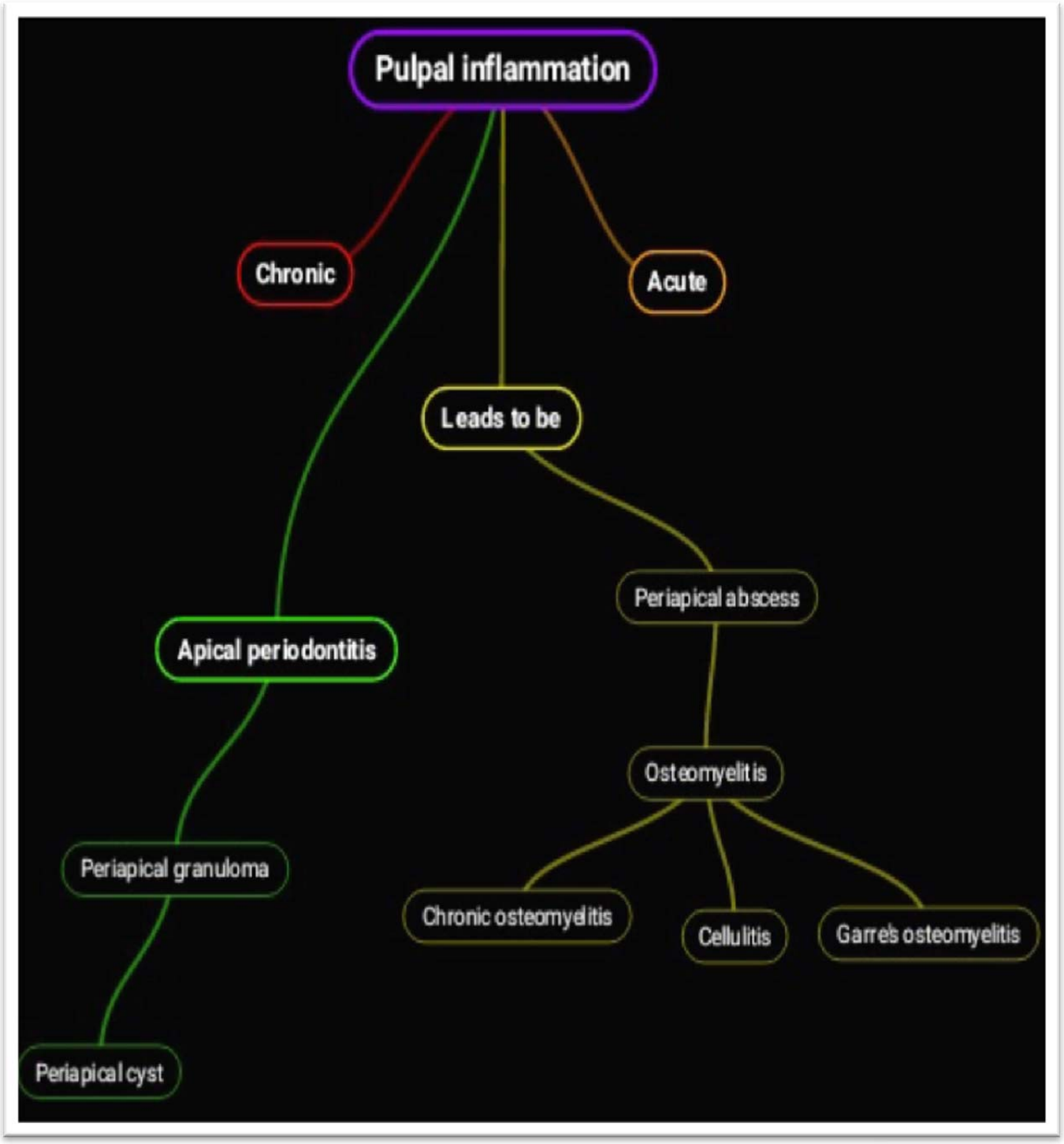
Pulpitis is inflammation of dental pulp tissue. The pulp contains the blood vessels the nerves and connective tissue inside a tooth and provides the tooth's blood and nutrients. Pulpitis is mainly caused by bacteria infection which itself is a secondary development of caries (tooth decay)(4). Pulpal pain is conducting by two sensory nerve fibres . And it is Sensory nerve fibers in the pulp consist of myelinized A-fibers, which prevail, and non-myelinizedC-fibers. Of the former, these are mainly A-delta fibers, which conduct the impulses faster, while, speaking of the latter, C-fibers, which are thinner and slower conducting (6). A-delta fibers are responsible for strong, immediate, sharp, well localized pain (5) and C-fibers for dull, continuous, and irradiating pain (5). Today, the most accepted theory of transmission of pain stimuli through the dentin to the pulp, is hydrodynamic theory, proposed by Gysi.(7)

Pulpal disease occurs due to following causes are (3)

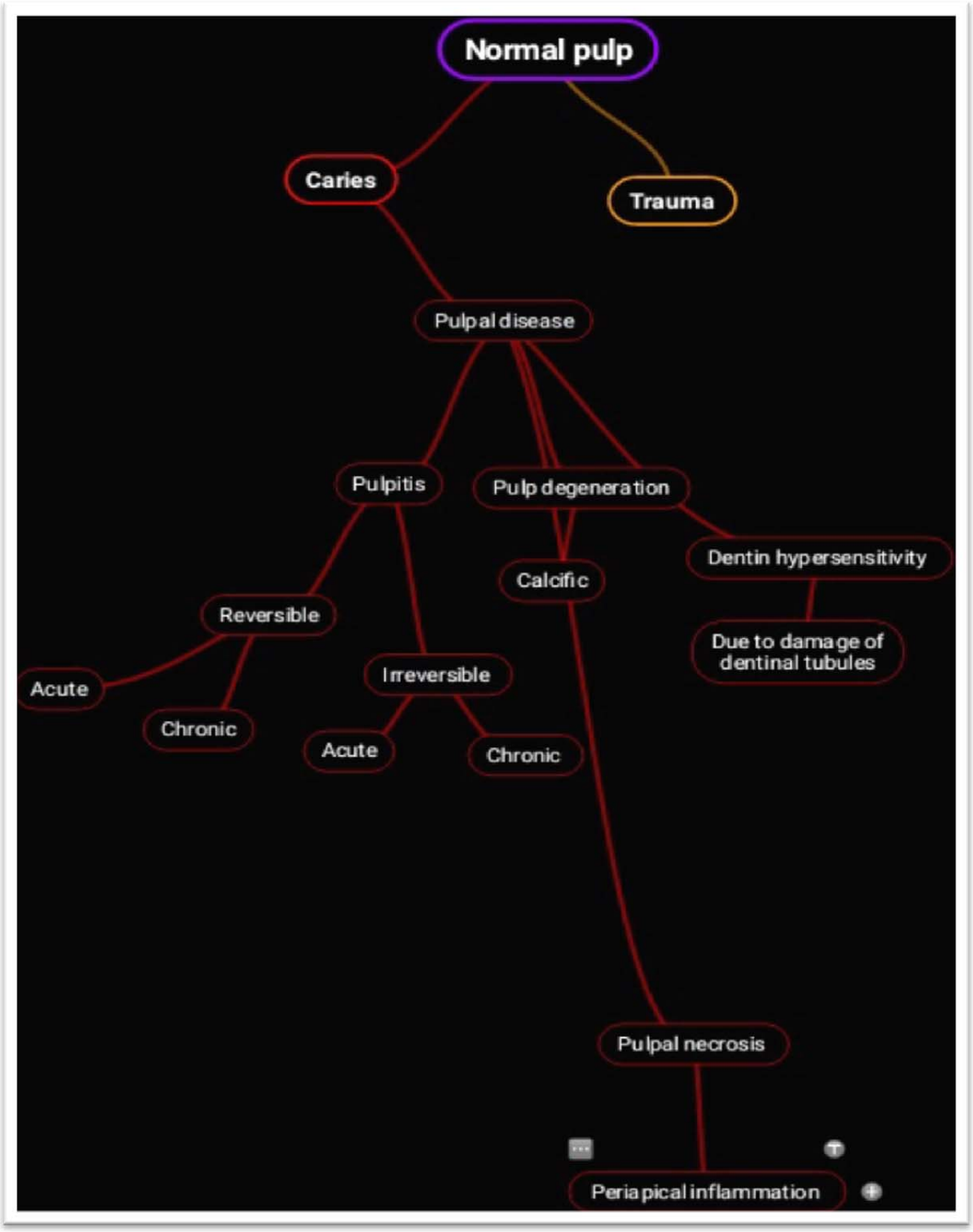


SEQUELAE OF PULPAL DISEASES:(3)

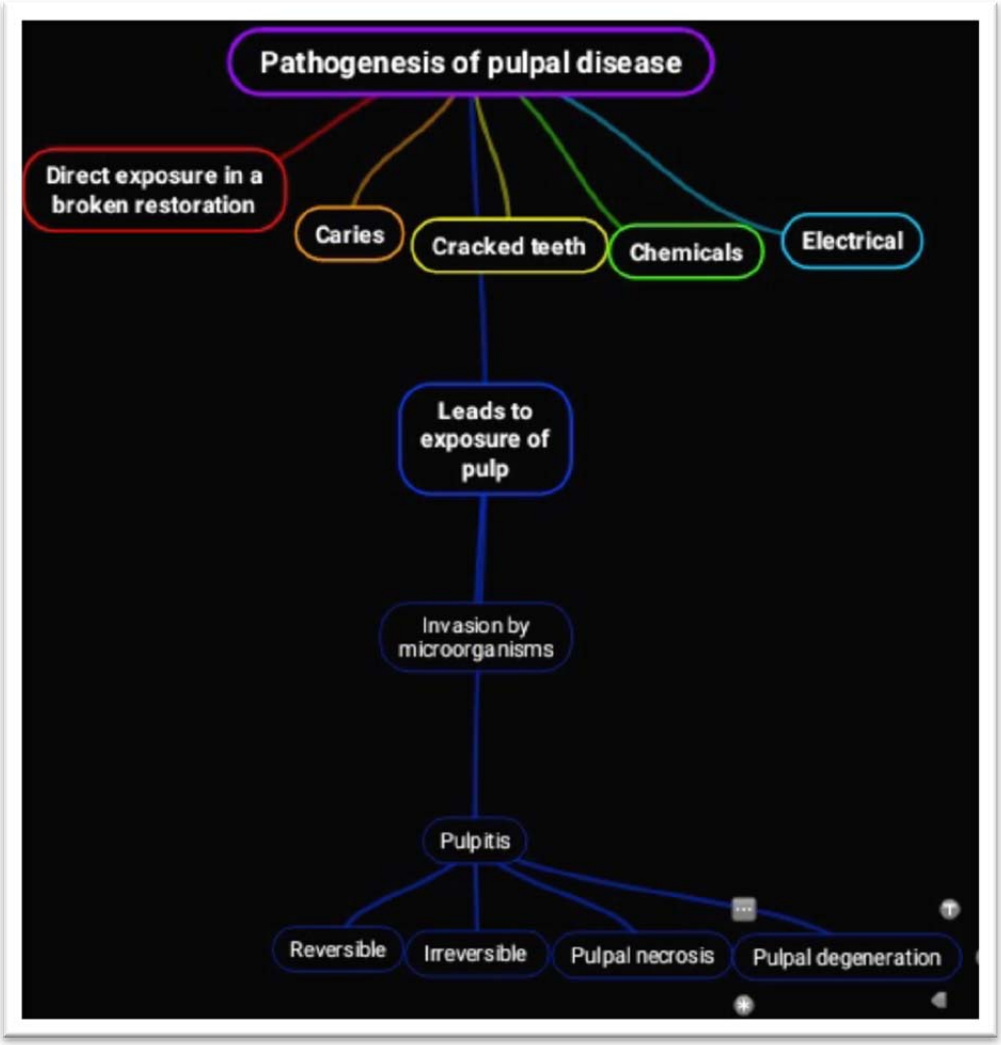



Pulpal inflammation
Chronic
Acute
Leads to be
Periapical abscess
Apical periodontitis
Osteomyelitis
Periapical granuloma
Chronic osteomyelitis
Cellulitis
Garre's osteomyelitis
Periapical cyst

CLASSIFICATION OF PULPAL DISEASE: (GROSSMAN'S CLASSIFICATION):(3)



PATHOGENESIS OF PULPAL DISEASES:(3)

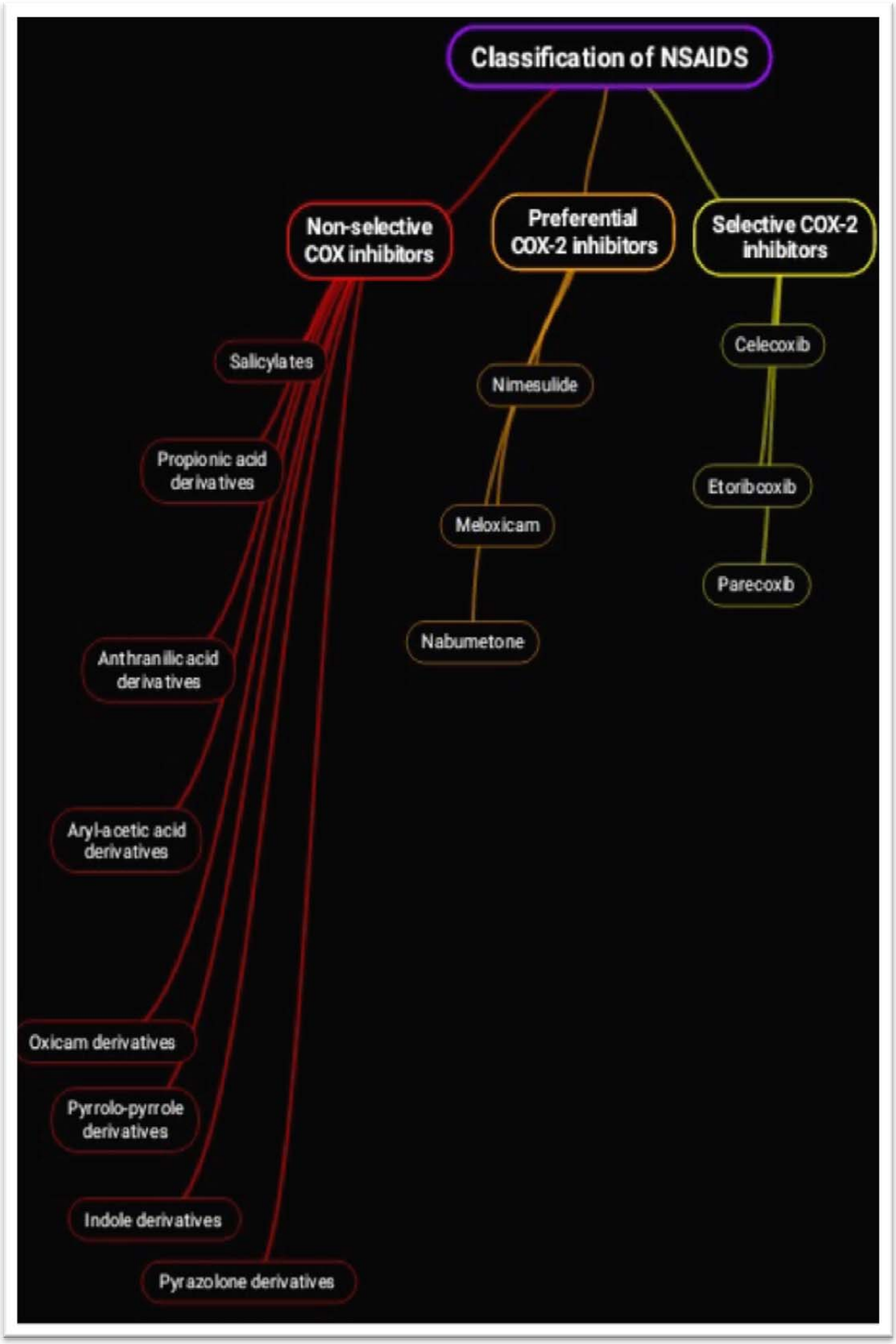


COX-2 INHIBITORS:

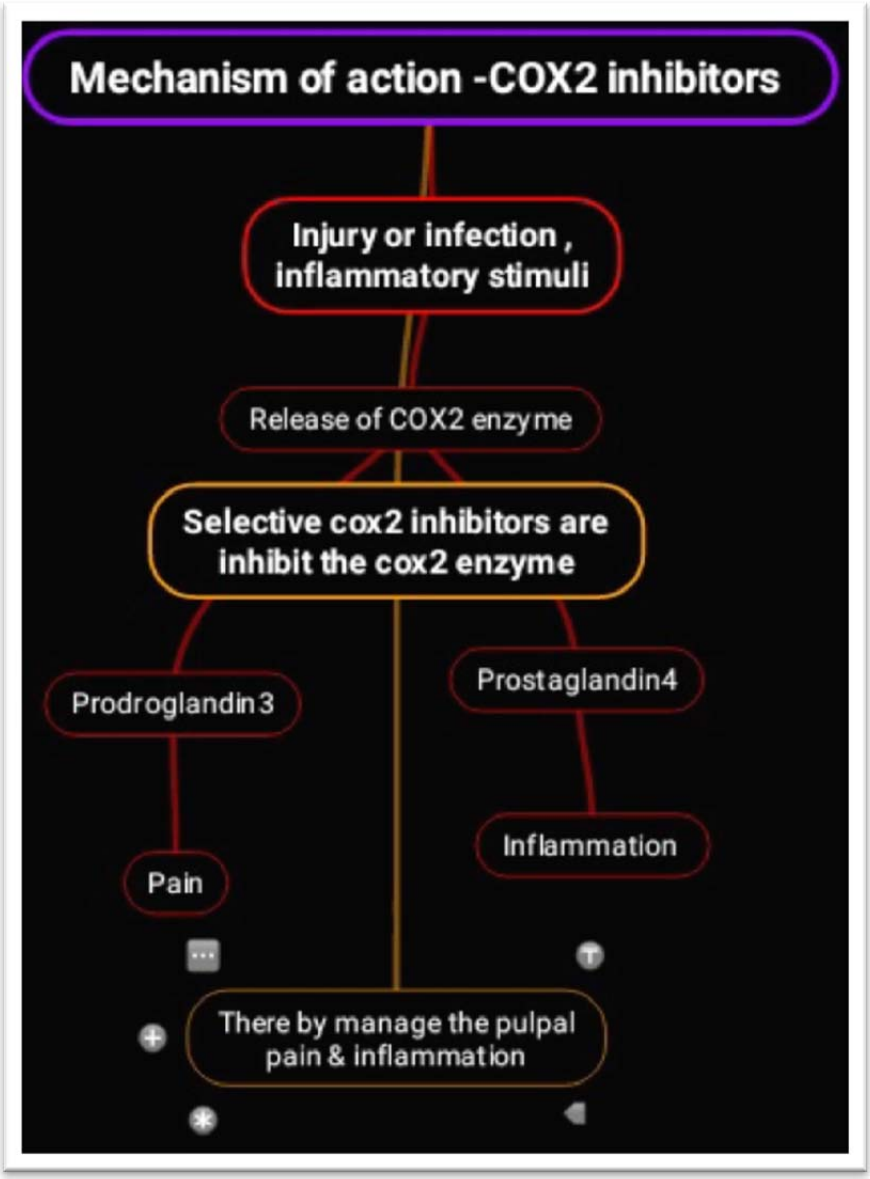
Selective COX-2 inhibitors are a type of non-steroidal anti-inflammatory drug (NSAID) that directly targets cyclooxygenase-2, COX-2, an enzyme responsible for inflammation and pain. Targeting selectivity for COX-2 reduces the risk of peptic ulceration, and is the main feature of celecoxib, rofecoxib and other members of this drug class.(8)

Agents such as non-steroidal anti-inflammatory drugs (NSAIDs), cyclooxygenase (COX)-2–selective inhibitors, and opioids are available for the treatment of acute pain (9). Patients with acute dental pain often require analgesic therapy for a short period of time, usually 2 to 4 days (10,11).Non- selective NSAIDs deliver anti-inflammatory and analgesic effects through inhibition of the COX-1 and COX-2 isozymes (9).After long-term use, non-selective NSAIDs increase the risk of developing peptic ulcer disease, GI bleeding and renal toxicity (13).The primary purported safety advantages of COX- 2 inhibitors over non-selective NSAIDs are related to their theoretical lack of associated gastropathy [12-15]. It is well established that non-selective NSAIDs impair platelet function by blocking thromboxane A2 biosynthesis (15,16).Non-selective NSAIDs also block the synthesis of prostacyclin, but the net effect of these events is a relatively weak inhibition of platelet function in the great majority of patients (17). Studies of COX-2–selective inhibitors such as rofecoxib and celecoxib have demonstrated efficacy in the treatment of acute pain (15-17). The analgesic benefit of these agents within the therapeutic range is attributable mainly to their inhibition of COX-2 without affecting COX-1. As high as 80% of referral patients with preoperative pain, experience pain after endodontic treatment. About one-fifth of patients report moderate to severe pain after endodontic therapies(18). Etoricoxib is a methylsulfyl second generation coxib. It has a considerable half-life of 22 hours with remarkable COX2/ COX1 inhibition ratio of 106 as compared to 7, 1.78, 3.12 and 1.78 for celecoxib, ibuprofen, aspirin and indomethacin, respectively. It is a good substitute for intolerant patients to non-selective NSAIDs with long lasting duration, comparable renal effects and the lower chance of gastrointestinal upset; hence it may be an acceptable alternative for whom ibuprofen is contraindicated(11). A few studies exist in the literature which assessed the analgesic effect of etoricoxib for pulpal pain.(19)

CLASSIFICATION OF NSAIDS:(20)



MECHANISM OF ACTION OF SELECTIVE COX-2 INHIBITORS :(20)



Management of pulpal pain :

There are various methods to manage the pulpal pain based on the following causes of pulpal pain . They are

1) In case of pulpal pain due to trauma or iatrogenic dental procedures,pathological wear, the treatment choice is root canal treatment only.
2) Pulpal pain due to dentin hypersensitivity then management is seal the dentin all tubules using restorative materials.
3) The most common management of pulpal pain is analgesic. Then followed by endodontic treatment.
4) The most effective analgesic to control the pulpal pain are COX-2 inhibitors because it has high potential to control pain without disturb any pathway and mainly inhibit the cox2 enzyme only so it as minimal side effects like peptic ulcer,GI bleeding,etc.
5) Selective COX-2 Inhibitors has only affecting the cox-2 without affecting the cox-1 function,some highly selective COX-2 inhibitors have Ben introduced over the past decade.they cause little gastric mucosal damage ,occurrence of peptic ulcer & ulcer bleeds is clearly lower than with traditional NSAIDs. They do not depress TXA2 production by platelets & do not inhibit platelet aggregation or prolong the bleeding time , but it reduce PGI2 production by vascular endothelium. Currently selective COX-2 inhibitors are called as COXIBS. It has three selective COX-2 inhibitors are celecoxib, etricoxib,& parecoxib are available in India. It has been concluded that selective COX-2 inhibitors are effective management of pulpal pain & highly used only in patients with high risk of peptic ulcers, perforation or bleeds. If it is selected should be administered in the lowest dose for shortest Period of time. And it should be avoided In patients with history of cardiac diseases.and there is no clear evidence as yet that etricoxib & lumaricoxib ,also increases CV risk.(21-24).

CONCLUSION:

Non-selective NSAIDs impair platelet function by blocking thromboxane A2 biosynthesis . Non-selective NSAIDs also block the synthesis of prostacyclin, but the net effect of these events is a relatively weak inhibition of platelet function in the great majority of patients .Studies of COX-2–selective inhibitors such as rofecoxib and celecoxib have demonstrated efficacy in the treatment of acute pain . The analgesic benefit of these agents within the therapeutic range is attributable mainly to their inhibition of COX-2 without affecting COX-1. As high as 80% of referral patients with preoperative pain, experience pain after endodontic treatment.SO The effect of selective COX-2 inhibitors are good for management of pulpal pain in various conditions.Many studies are demonstrated the effects of selective COX-2 inhibitors for management of pulpal pain & also minimal dosage only given to the patients so that minimal adverse effects & act as a good analgesics.

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