

# Medical Management of the Surgical Patient with Cardiovascular Disorder

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Due to the advances in medical treatments and medications for patients with chronic diseases, the expectant life for those patients has been greatly increased over the past years. As a result, it became more common to see such patient in our dental practises. Medically compromised patient requires careful History taking, examination and special investigations, this will identify whether the patient is fit or not for any dental procedure and thereby reducing any perioperative, intraoperative and postoperative risks (Coulthard *et.al.*, 2013).

## Hypertension

Hypertension can be defined as a persistent increase in blood pressure, over 140/90 mmHg from an increased peripheral arteriolar resistance.

### Hypertension can be either:

1. Primary (Essential) hypertension, the cause of which is unknown. However, genetics, alcohol, salt and obesity are thought to be contributing factors.
2. Secondary hypertension, which can be caused by renal disease, pregnancy, steroid therapy or rare endocrine problems (such as Cushing syndrome or pheochromocytoma).

## Classification and dental management of hypertensive patients

According to the Systolic and Diastolic blood pressure patients can be classified into different categories. The dental management of those patients varies according to the corresponding category (Table.1) (Kalantzis and Scully, 2010).

**Table 1 Classification and dental management of hypertensive Patients**

Blood Pressure (mmHg)	Hypertension Stage	Dental Management
<140 / <90	-	None, Routine dental care can be done
140-159 / 90-99	1	Recheck blood pressure at each visit, Routine dental care can be done.
160-179 / 100-109	2	Recheck blood pressure at each visit, Medical consultation is required before routine dental care can be done. Restrict use of adrenaline in L.A. . Conscious sedation may be beneficial to reduce the stress.
≥180 / ≥110	3	Recheck blood pressure at each visit, Only emergency dental care can be done until blood pressure is controlled, Medical consultation is required before dental care, Avoid use of vasoconstrictors.

## General Manifestations Caused by the Adverse Effects of Antihypertensive Drugs (Popescu *et.al.*, 2013)

1. Xerostomia (Dry mouth): This can be caused by thiazide diuretics, Angiotensin converting enzyme inhibitors. The incidence and severity of xerostomia is increased with concomitant intake of those medications.

2. Gingival Hyperplasia: The calcium channel blocker can cause the gingival hyperplasia, the nifedipine being the most common one. The severity of the hyperplasia can be dose related.

3. Lichenoid drug reaction: Many antihypertensive can cause this adverse reaction including thiazide diuretics, furosemide, propranolol and captopril.

4. Postural hypotension: can be caused by antihypertensive agents so it's necessary to raise back of the patient slowly after treatment in the dental chair.



Figure 1 (Left) Gingival hyperplasia caused by Calcium Channel blocker, (Right) Lichenoid drug reaction affecting buccal mucosa

## **Drug Interactions between Antihypertensive agents and Drugs Used in Dentistry**

1. The cardiovascular effect of Epinephrine in local anaesthetic agents can be potentiated by the use of non-selective  $\beta$ -Blocker (e.g. Propranolol). Guidelines recommend decreasing the dose (Maximum of 2 cartridges of LA with 1:100,000 epinephrine for patients with cardiac risk with negative aspiration) and increasing the time interval between epinephrine injections. In general there is no strong evidence that contraindicate the use of Local anaesthesia with epinephrine in hypertensive patient; in fact a profound anaesthesia that the vasoconstrictor helps to achieve is critical for those patients in order to minimize stress during dental procedures that in turn elevates the blood pressure.

2. Long-term use of NSAIDs may antagonize the antihypertensive effect of diuretics,  $\beta$ -blockers,  $\alpha$ -blockers and Angiotensin converting enzyme inhibitors. Other analgesics (e.g. Paracetamol) can be used to avoid this side effect.

## Ischemic heart disease

Ischemic heart disease occurs when the oxygen supply to the myocardium is insufficient for its demand. This principally can occur due to either spasm or obstruction. Previously, this was thought to occur due to slowly enlarging hard plaque that occludes the lumen of coronary arteries. Recently, this theory is replaced by the theory of soft plaque rupture. These soft plaques have thin membranes that encircle a thrombogenic lipid core. When this membrane ruptures, the thrombogenic lipid core will be exposed and initiate a clotting cascade forming a thrombus, that occludes the vessel and precipitates angina pectoris or more severe myocardial infarction (Miloró *et al.*, 2004).

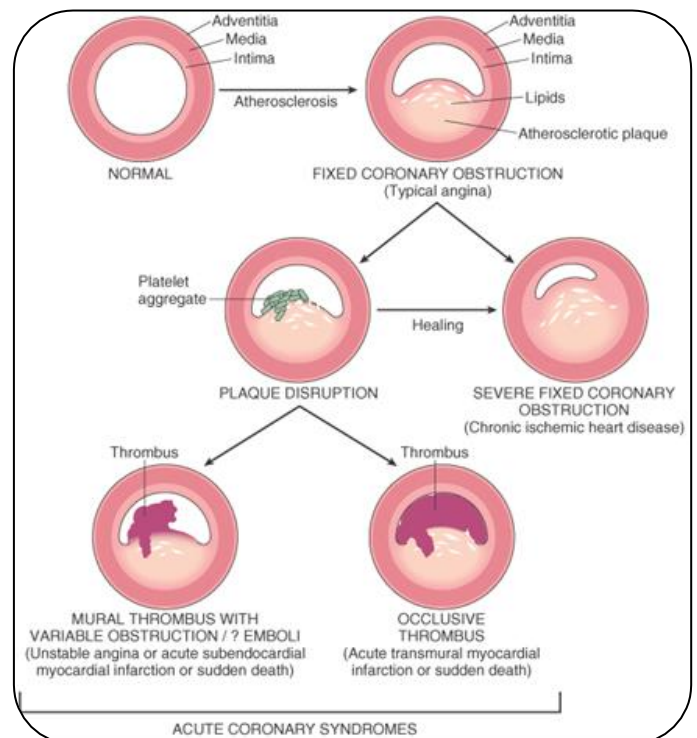


Figure 2 Pathophysiology of ischemic heart disease

### Risk factors for Ischemic heart disease (Kalantzis and Scully, 2010)

1. Positive family history.
2. Male gender.
3. Diabetes mellitus.
4. Elevated cholesterol level, including total cholesterol and LDL-cholesterol with low HDL-cholesterol.
5. Hypertension.
6. Cigarette smoking.

### Angina Pectoris and Myocardial Infarction (Miloró *et al.*, 2004)

Angina Pectoris is a sensation of squeezing, choking, or tight feeling in the substernal region radiating to the throat, shoulders and arms (commonly left arm), when the oxygen supply to the myocardium is insufficient for its

demand. This might be accompanied by dyspnea and nausea. Angina symptoms usually resolve after resting or by use of sublingual nitroglycerin. Patient who experience those symptoms at rest, with increasing frequency or with minimal effort is considered to have unstable angina. On the other hand, Myocardial infarction symptom is more severe and persist despite resting or by the use of nitroglycerin.

### **Dental management of patients with Ischemic heart disease (Silvestre *et.al.*, 2002)**

For stable angina, routine dental treatment can be done after consultation with physician, proven that prior measurement of pulse rate and blood pressure is taken before each visit. The patient should also bring his/her nitroglycerin to each visit in case it's needed if angina developed or to be taken as prophylactic measurement.

The patient should also have adequate pain control by local anaesthesia to prevent any stress during the procedure; however a maximum of two cartridges should be given with negative aspiration. Any more anaesthetic solution to be added should be without vasoconstrictor. The anxiety can be controlled by anxiolytics such as diazepam (Valium) 5mg 1-2 hours before procedure. Inhalation sedation can be of good use for those patients.

The dental procedure is preferred by many patients in semi-supine position and should be limited to 30 minutes, between late morning and early afternoon period.

Unstable angina patient should only receive emergency treatment limited to extraction, abscess drainage and pulpectomies after consultation with physician and preferably in hospital setting.

Patient with history of myocardial infarction for more than 6 months is managed similar to having stable angina, while if the infarction occurred less than 6 months ago , only emergency treatment is offered and elective treatment is best deferred, as the myocardial infarction might recur during this period.

## Emergency management of patient having chest pain (Cruz-Pamplona *et.al.*, 2011)

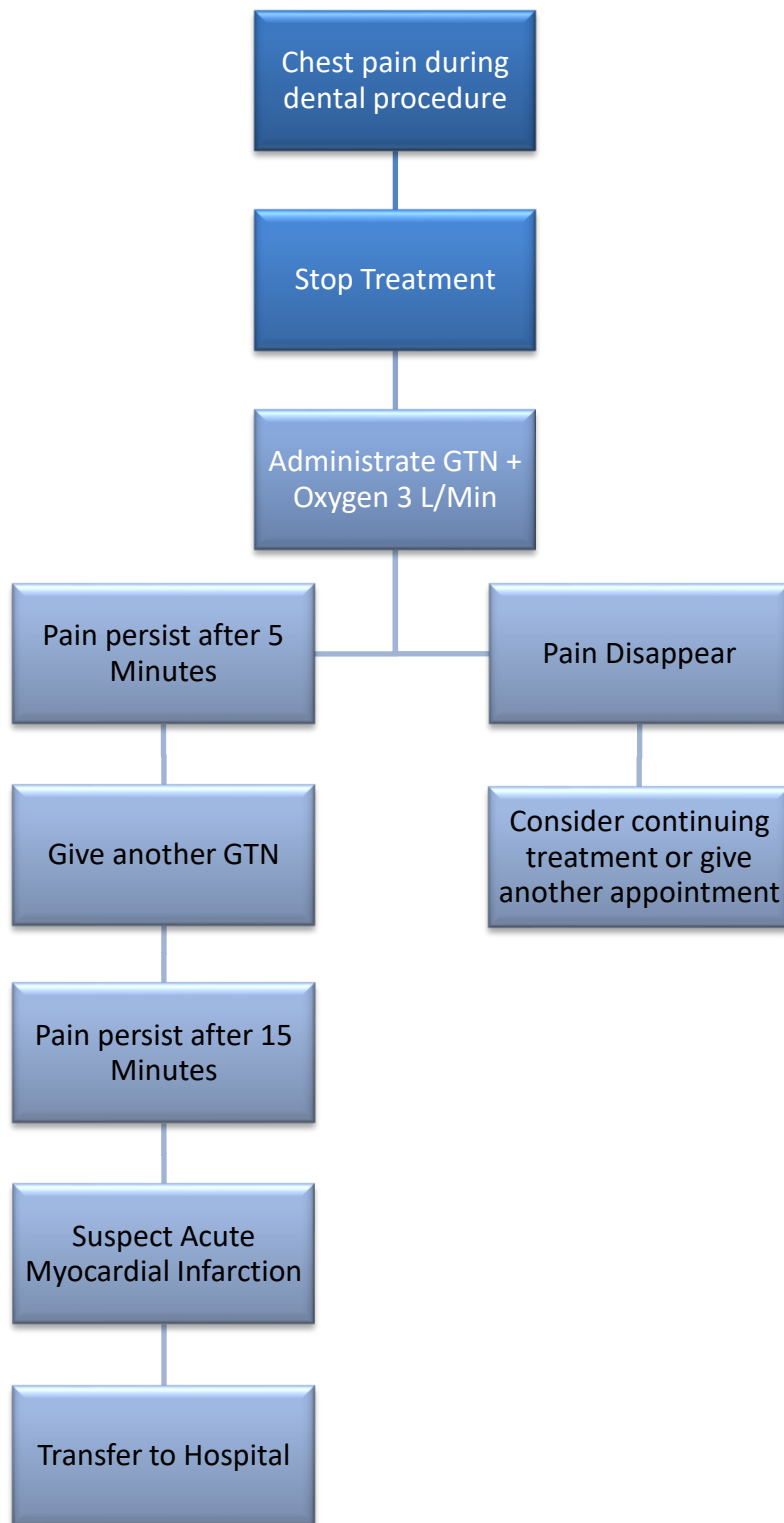


Figure 3 Emergency management of patient having chest pain

## Management of Patients on Antithrombotic Medication

If patient is on antiplatelet medication or anticoagulant, extra care should be taken as these patients tend to have excessive bleeding. Antiplatelet medication (e.g. Aspirin, Clopidogrel) prevents platelets aggregation and this can be detected by measuring the bleeding time. For patient on mono-therapy (one antiplatelet medication), if bleeding time <20 minute, it's likely to be safe to proceed without altering the patient's medication. In this instance the risk of developing thromboembolic event, due to interruption of medication, overweight the risk of postoperative haemorrhage which can be controlled by local measures. On the other hand, If bleeding time (>20mint) there must be adjustment to aspirin after consultation with patient's physician, one author suggests discontinuation of aspirin for 3 days to allow enough functional platelets in circulation (Little *et al.*, 2002). For patient on dual-therapy (e.g. Aspirin and Clopidogrel), it's better to be managed in hospital setting.

Regarding anticoagulant (e.g. Warfarin), those patients need to monitor their INR (International normalized ratio) within 72 hours prior to any dental intervention that may have risk of bleeding. Patients taking warfarin whose INR <2.5 are likely to be safe to have dental intervention without altering their medication. However if INR >2.5, those may require alteration in their medication (Partial or Complete interruption) after consultation with physician. One proposed method is stopping warfarin 4-days prior to surgery to decrease INR to therapeutic levels then restarting it after surgery.

Patients who take combined therapy (Aspirin and Warfarin) are at increased risk of bleeding than those on Anticoagulant alone (Murphy *et al.*, 2009). In 2007, The British Dental Journal issued an article about management of patients on oral anticoagulant which recommends that patients with concomitant intake of warfarin and aspirin should have dental surgery in hospital setting since they are at higher risk for post-operative bleeding (Perry *et al.*, 2007).



## Reference

- COULTHARD, P., HORNER, K., SLOAN, P. & THEAKER, E. D. 2013. *Master Dentistry, Volume 1: Oral and Maxillofacial Surgery, Radiology, Pathology and Oral Medicine, 3: Master Dentistry*, Elsevier.
- CRUZ PAMPLONA, M., JIMÉNEZ SORIANO, Y. & SARRIÓN PÉREZ, M. G. 2011. Dental considerations in patients with heart disease.
- KALANTZIS, A. & SCULLY, C. 2010. *Applied Medicine and Surgery in Dentistry*, Oxford University Press.
- LITTLE, J. W., MILLER, C. S., HENRY, R. G. & MCINTOSH, B. A. 2002. Antithrombotic agents: implications in dentistry. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*, 93, 544-51.
- MILORO, M., GHALI, G. E., LARSEN, P. E. & WAITE, P. D. 2004. *Peterson's Principles of Oral and Maxillofacial Surgery*, Canada, BC Decker - London.
- Murphy, S., Duncan, J. & Thompsett, C. (2009) *TRUST GUIDELINE FOR THE MANAGEMENT OF ADULT PATIENTS WHO REQUIRE ELECTIVE SURGERY OR AN INVASIVE PROCEDURE WHILST THEY ARE ANTICOAGULATED WITH WARFARIN OR ON ANTIPLATELET THERAPY* [Online]. TRUST. Available: <http://www.bsuh.nhs.uk/EasysiteWeb/getresource.axd?AssetID=355788&type=> [Accessed 1ST November 2014].
- PERRY, D. J., NOAKES, T. J. & HELLIWELL, P. S. 2007. Guidelines for the management of patients on oral anticoagulants requiring dental surgery. *Br Dent J*, 203, 389-93.
- POPESCU, S. M., SCRIECIU, M., MERCU, V., TUCULINA, M. & DASCLU, I. 2013. Hypertensive Patients and Their Management in Dentistry. *ISRN Hypertension*, 2013, 8.
- SILVESTRE, F. J., MIRALLES-JORDA, L., TAMARIT, C. & GASCON, R. 2002. Dental management of the patient with ischemic heart disease: an update. *Med Oral*, 7, 222-30.