



Medications

Medications are often required in the treatment of cardiac problems arising from congenital heart defects or surgeries required to correct such defects. Medications do not cure the underlying problem, but may successfully manage the symptoms. The goal of medication treatment is to improve heart function and limit the progression of disease.

There are several categories of cardiac medications used with congenital heart patients, depending on the type of underlying heart problem. This chapter addresses each of these major drug groups. Be sure to consult with your physician, nurse and/or pharmacist for detailed information on any prescribed medication. Carefully note any possible side effects, special considerations and/or warnings. Always inform any treating doctor or dentist of the complete list of currently prescribed and over-the-counter (OTC) drugs used. Consult your doctor before using most OTC medications or homeopathic/alternative medicine or herbal medicine or vitamins and read all product labels carefully. Many OTC preparations are contraindicated for use with heart or blood pressure problems. There can also be potential drug interactions.



ACE Inhibitors/Vasodilators

Vasodilators are medications that expand or dilate blood vessels and therefore increase blood flow. One of the most frequently used vasodilators is the ACE inhibitor.

ACE stands for Angiotensin Converting Enzyme inhibitor. ACE inhibitors work by blocking the conversion of the enzyme angiotensin I to angiotensin II, which narrows or constricts blood vessels. ACE inhibitors are used to treat heart failure and hypertension. By reducing vasoconstriction, the vessels' resistance to blood flow, ACE inhibitors help to improve blood flow and in turn can also reduce any congestion of blood in body organs, skin and lungs. By reducing vascular resistance, ACE inhibitors also reduce blood pressure. At the same time, ACE inhibitors also increase renal (kidney) blood flow and therefore have an indirect diuretic effect, removing water from the body through increased urination.

All medications have possible side effects. ACE inhibitors may cause a dry persistent cough, low blood pressure with associated dizziness or weakness and/or swelling of face, lips or neck.



Anticoagulants

Anticoagulants are drugs used to reduce the formation of clots (coagulation) in the blood stream. When the blood is slow to empty from the heart chambers because of poor pumping ability, clots can form and be propelled to lungs or body circulation. Anticoagulants assist in the prevention of stroke, heart attack or pulmonary embolism.

There are three methods of administering anticoagulants. Heparin is administered via intravenous lines, which is helpful when it is necessary to provide immediate anticoagulant protection. Lovenox, an injectable form, is often used when first beginning anticoagulant therapy because it is faster than the oral method. Oral therapy is used for long-term effects, usually as the medication Warfarin (Coumadin). Low dose aspirin therapy is used for gentler anticoagulation.

When taking oral anticoagulants, the prescribing physician will schedule regular blood testing called prothrombin time or INR test (International Normalized Ratio) to monitor therapeutic blood clotting times. This is to ensure that the blood is not "too thin," meaning too anticoagulated, or "too thick," meaning not anticoagulated enough. There is a desired therapeutic range, which may vary slightly depending on the heart problem being treated. Patients on anticoagulation medication may need adjustment or interruption of treatment before dental or surgical procedures.

Vitamin K helps the blood make clots. While on anticoagulant medication, a child does not need to avoid these types of food, but parents should take care to keep them at a consistent level in the diet. Leafy green vegetables are very high in vitamin K.

Anticoagulants are very important medications. If not taken properly, or not regularly monitored, they can cause serious complications, such as uncontrolled bleeding. There are several special considerations for patients who are taking anticoagulant medications.

Timing. It is important to take this medicine at the same time each day. If a dose is accidentally omitted, do not double the next dose.

Interactions. This medication can have significant interactions with other medications. Consult with your doctor before adding any new medicine, even over-the-counter medicines - such as aspirin or ibuprofen.

Inform the physician. Be sure to inform any physician or dentist that your child is taking Warfarin/Coumadin and why.

Alcohol. Warfarin/Coumadin's effect can be exaggerated by the use of alcohol, which may increase the risk of bleeding problems.

Contact sports. Contact sports, such as boxing, hockey and football, should be avoided during the use of anticoagulants.

Head trauma or headache. If your child experiences significant head trauma, or unusual headache, inform your doctor immediately.

Abnormal bleeding. If any abnormal bleeding is observed, consult your physician immediately. For example: bleeding that does not stop easily, blood in urine or stool, vomiting blood or coffee ground-like material, coughing up blood, or excessive bruising.

Medi-alert bracelet. It is advisable for your child to wear a medi-alert bracelet, neck chain pendant or wallet card stating the use of Warfarin/Coumadin, in the event you are unable to communicate to emergency professionals.

Stay informed. Talk with your doctor, nurse or pharmacist about receiving literature on anticoagulant medicines.



Antiarrhythmics

There are several types of drugs used to treat irregular heartbeats, or arrhythmias. These medications act on specific sites to alter the transmission of electrical impulses that signal the heart to beat.

Amiodarone. Amiodarone is used to treat recurrent ventricular fibrillation, unstable ventricular tachycardia, supraventricular arrhythmias and atrial fibrillation. Amiodarone has diverse effects on several sites in the heart to suppress abnormal signal formation and conduction. It is among the most commonly

used agents to control irregular heart rhythms. Patients who take amiodarone must be monitored for four main potential side effects: pulmonary fibrosis by chest x-ray and pulmonary function tests; thyroid function laboratory tests to look for thyroid dysfunction; liver function lab test to monitor for liver toxicity; and, regular eye exams to monitor for optic neuropathy.

Parents are advised to make sure their child wears sunscreen because of increased risk of photosensitivity, especially sunburn and blistering, when taking amiodarone. Parents may also be encouraged to give their child this medication with meals to avoid stomach upset. The potential for drug/drug interactions, especially with digoxin and dilantin, may require the prescribing doctor to readjust other medication doses.

Adenosine. Adenosine is used to treat paroxysmal supraventricular tachycardia. It acts on the atrio-ventricular node to slow conduction. This drug is only available in intravenous form and is therefore only administered in the hospital setting. It is to be used with caution in patients with asthma because it may cause bronchospasm.

Beta blockers. Beta blockers are used to treat arrhythmias by prolonging the refractory period (nonexcitable) of the AV node and reducing AV conduction, thereby reducing the likelihood that extra beats will occur. (See below for more in Beta Blockers.)

Calcium channel blockers. Calcium channel blockers act to reduce calcium influx into the cells, especially at the SA and AV nodes, thereby slowing conduction through the heart. They are used to slow the ventricular rate in atrial fibrillation or flutter and to convert supraventricular tachycardia to normal rhythm.

Digoxin. (See Inotropic Drugs below.)



Beta Blockers

Beta blockers are used to treat a variety of medical problems from hypertension, angina, arrhythmias, heart failure, and myocardial infarct to migraine headaches and benign tremors.

In the treatment of hypertension, beta blockers are thought to reduce cardiac output, decrease the release of the kidney hormone renin, and lower the sympathetic

effect on the central nervous system that results in excitability of the heart muscle. In anginal treatment, beta blockers decrease the heart muscle's oxygen demands by blocking increases in heart rate, blood pressure and heart contraction induced by catecholamine or adrenaline.

Beta blockers used to treat arrhythmias act to prolong the refractory (nonexcitable) period of the AV (atrio-ventricular) node and reduce AV conduction, thereby reducing the likelihood that extra beats or palpitations will occur.

For patients at risk of myocardial infarction, some beta blockers are used to prevent a heart attack. The mechanism responsible is not yet fully understood.

Possible side effects of beta blocker medications include: low heart rate, fatigue, depression, insomnia, nightmares, memory loss and impotence. These medications can affect blood sugars and should be used with caution in diabetic patients. These medications are not recommended for patients with asthma as they can exaggerate bronchospasm.

As with all prescription medications, beta blockers should be taken as directed on a regular schedule and not abruptly discontinued unless advised by the prescribing physician.

Be sure to consult your doctor before taking any new medication to avoid possible drug interactions.



Diuretics

Diuretics are often referred to as "water pills" because they stimulate the kidneys to remove excess water and salt from the body by increased urine output. There are several types of diuretics and they all have the same main effect, but act upon various parts of the kidneys.

Diuretics are used in the treatment of heart failure and hypertension. They are often used in combination with other medications. Some diuretics can lead to potassium

depletion and a potassium supplement may be prescribed. However, not all diuretics cause potassium loss. Some are potassium sparing. It is advisable to take diuretics in the morning so the majority of diuresis (urination) will occur before bedtime. The physician may ask patients to keep a log of their daily weights to monitor the diuretic effect and therefore control of heart failure to avoid potential dehydration.



Experimental Drugs/Drug Studies

Medical researchers make gains everyday in the discovery of new treatments. Before new medications can be approved by the FDA, they must be rigorously studied, first on animals and then on people. There may be benefits to being enrolled in a drug study. The medicine is usually available to patients free of charge along with free medical follow-up. However, you must first be sure that the research is being conducted by a reputable hospital, university and physician. You may contact the FDA office of consumer affairs to find out more about experimental drug studies.



Inotropic Drugs

The inotropic, or muscle strengthening medications, such as Digoxin are prescribed for the treatment of heart failure, atrial fibrillation or flutter, or paroxysmal atrial tachycardia.

In heart failure, Digoxin causes the heart to slow down and pump blood more efficiently. It increases cardiac output by increasing the force of each contraction of the heart muscle (systole).

Digoxin is used to treat rapid heart rates because of its ability to increase the parasympathetic nervous system, thereby counteracting excess catecholamine activity produced by heart failure. Digoxin may be used alone or in combination with other medications.

Side effects include nausea, vomiting, visual changes and fatigue especially if there is too much Digoxin in the system (Digoxin toxicity).

It is advisable to take Digoxin at a regular time each day and consult your doctor before taking any new medicines.

There are other inotropic (muscle strengthening) medications such as Dobutamine and Dopamine, which are more potent but only available in IV form. Their action is dose dependent, which means low doses and high doses will cause different actions. These are only administered in the hospital.



Potassium Supplements

Potassium supplements are sometimes prescribed in conjunction with some diuretics because of an increased loss of potassium with the extra fluid loss. A balance of potassium is necessary for the proper function of the heart's electrical impulses. Significantly high or low potassium can cause irregular heartbeats. Potassium levels can be measured by a simple blood chemistry test.

In addition, a diet rich in potassium, found in bananas, orange juice, carrot juice, is often recommended.



Conclusion

This chapter has briefly touched on several categories of medications. Additional detailed medication information is available from physicians, nurses, and pharmacists. Always inform any treating doctor or dentist of the complete list of prescribed and over-the-counter medications. Consult with your doctor before using most over-the-counter medications or homeopathic/alternative medicines. Be advised to read all product labels carefully.

