CARDIAC OUTPUT AND REGIONAL FLOW IN HEALTH AND DISEASE (DEVELOPMENTS IN CARDIOVASCULAR MEDICINE) pdf

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*Cardiac Output and Regional Flow in Health and Disease (Developments in Cardiovascular Medicine) [A-M. Salmasi, A.S. Iskandrian] on www.enganchecubano.com *FREE* shipping on qualifying offers. Cardiac output has always been a subject of interest to both clinicians and researchers in different branches of medicine and surgery.*

Interest in the humane and scientifically justifiable use of research animals has intensified since the publication of the first edition of this textbook. This completely revised and updated text provides information essential to any researcher interested in using animal models for cardiovascular research, or any research which requires normal cardiovascular function. The format and presentation have been changed to make the text more easy to read and use. An introductory chapter offers general principles of animal selection, pre and post-operative care, preanesthesia, chemical restraint, analgesia, and the recognition of pain. The number of references cited has been almost doubled over the previous text and the chapter tabulating normal cardiovascular parameters from intact, awake animals, of those species commonly used in research, has been greatly expanded. Other chapters providing comprehensive data on the cardiovascular effects of opioids, tranquilizers, anesthetic agents and other drugs commonly used in cardiovascular research have been expanded with special emphasis on species variability to drug effects. The chapters on both naturally occurring and iatrogenic models of cardiovascular disease have also been expanded and updated. In the past, coronary arteriography was the only modality available to provide high quality images of the coronary anatomy. Quantitative coronary arteriography QCA was developed, implemented, validated and extensively applied to obtain accurate and reproducible data about coronary morphology and the functional significance of coronary obstructions. Over the last few years extensive basic technological research supported by clinical investigations has created competing modalities to visualize coronary morphology and the associated perfusion of the myocardial muscle. Currently, the following modalities are available: X-ray coronary arteriography, intracoronary ultrasound, contrast- and stress-echocardiography, angioscopy, nuclear cardiology, magnetic resonance imaging, and cine and spiral CT imaging. For all these imaging modalities, the application of dedicated quantitative analytical software packages enables the evaluation of the imaging studies in a more accurate, reliable, and reproducible manner. These extensions and achievements have resulted in improved diagnostics and subsequently in improved patient care. Particularly in patients with ischaemic heart disease, major progress has been made to detect coronary artery disease in an early phase of the disease process, to follow the atherosclerotic changes in the coronary arteries, to establish the functional and metabolic consequences of the luminal obstructions, and accurately to assess the results of interventional therapy. Aside from all these high-tech developments in cardiac imaging techniques, the transition from the analogue to the digital world has been going on for some time now. This has been a major achievement in the field of standardization activities. Since these developments will have a major impact on the way images will be stored, reviewed and exchanged in the near future, an important part of this book has been dedicated to DICOM and the filmless catheterization laboratory. Cardiovascular Imaging will assist cardiologists, radiologists, nuclear medicine physicians, image processing specialists, physicists, basic scientists, and fellows in training for these specialties to understand the most recent achievements in cardiac imaging techniques and their impact on cardiovascular medicine. Find Your eBooks Hereâ€¦.

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2: Pregnancy complicated by maternal congenital cardiac disease - Mayo Clinic

Cardiac output has always been a subject of interest to both clinicians and researchers in different branches of medicine and surgery. In the last decade more attention has also been paid to its application in pediatrics, neonatology, fetal medicine and pregnancy.

CSA is the valve orifice cross sectional area, r is the valve radius, and, VTI is the velocity time integral of the trace of the Doppler flow profile. Being non-invasive, accurate and inexpensive, Doppler ultrasound is a routine part of clinical ultrasound; it has high levels of reliability and reproducibility, and has been in clinical use since the s. Echocardiography[edit] Echocardiography is a non-invasive method of quantifying cardiac output using ultrasound. Two-dimensional 2D ultrasound and Doppler measurements are used together to calculate cardiac output. The result is then multiplied by the heart rate HR to obtain cardiac output. Although used in clinical medicine, it has a wide test-retest variability. An alternative that is not necessarily more reproducible is the measurement of the pulmonary valve to calculate right-sided CO. Although it is in wide general use, the technique is time consuming and is limited by the reproducibility of its component elements. It uses anthropometry to calculate aortic and pulmonary valve diameters and CSAs, allowing right-sided and left-sided Q measurements. In comparison to the echocardiographic method, USCOM significantly improves reproducibility and increases sensitivity of the detection of changes in flow. Real-time, automatic tracing of the Doppler flow profile allows beat-to-beat right-sided and left-sided Q measurements, simplifying operation and reducing the time of acquisition compared to conventional echocardiography. USCOM has been validated from 0. USCOM is the only method of cardiac output measurement to have achieved equivalent accuracy to the implantable flow probe. Transoesophageal Doppler includes two main technologies; transoesophageal echocardiogram â€”which is primarily used for diagnostic purposes, and oesophageal Doppler monitoringâ€”which is primarily used for the clinical monitoring of cardiac output. The latter uses continuous wave Doppler to measure blood velocity in the descending thoracic aorta. An ultrasound probe is inserted either orally or nasally into the oesophagus to mid-thoracic level, at which point the oesophagus lies alongside the descending thoracic aorta. Because the transducer is close to the blood flow, the signal is clear. The probe may require re-focussing to ensure an optimal signal. This method generally requires patient sedation and is accepted for use in both adults and children. Pulse pressure methods[edit] Pulse pressure PP methods measure the pressure in an artery over time to derive a waveform and use this information to calculate cardiac performance. However, any measure from the artery includes changes in pressure associated with changes in arterial function, for example compliance and impedance. Physiological or therapeutic changes in vessel diameter are assumed to reflect changes in Q. PP methods measure the combined performance of the heart and the blood vessels, thus limiting their application for measurement of Q. This can be partially compensated for by intermittent calibration of the waveform to another Q measurement method then monitoring the PP waveform. Ideally, the PP waveform should be calibrated on a beat-to-beat basis. There are invasive and non-invasive methods of measuring PP. The principle of the volume clamp method is to dynamically provide equal pressures, on either side of an artery wall. By clamping the artery to a certain volume, inside pressureâ€”intra-arterial pressureâ€”balances outside pressureâ€”finger cuff pressure. The use of finger cuffs excludes the device from application in patients without vasoconstriction, such as in sepsis or in patients on vasopressors. These methods include the use of modulated infrared light in the optical system inside the sensor, the lightweight, easy-to-wrap finger cuff with velcro fixation, a new pneumatic proportional control valve principle, and a set point strategy for the determining and tracking the correct volume at which to clamp the finger arteriesâ€”the Physiocal system. An acronym for physiological calibration of the finger arteries, this Physiocal tracker was found to be accurate, robust and reliable. A generalised algorithm to correct for the pressure level difference between the finger and brachial sites in patients was developed. This correction worked under all of the circumstances it was tested inâ€”even when it was not designed for itâ€”because it

applied general physiological principles. This innovative brachial pressure waveform reconstruction method was first implemented in the Finometer, the successor of Finapres that BMI-TNO introduced to the market in At the proximal aortic site, the 3-element Windkessel model of this impedance can be modelled with sufficient accuracy in an individual patient with known age, gender, height and weight. According to comparisons of non-invasive peripheral vascular monitors, modest clinical utility is restricted to patients with normal and invariant circulation. This is generally done by connecting the catheter to a signal processing device with a display. The PP waveform can then be analysed to provide measurements of cardiovascular performance. Changes in vascular function, the position of the catheter tip or damping of the pressure waveform signal will affect the accuracy of the readings. Invasive PP measurements can be calibrated or uncalibrated. In both cases, an independent technique is required to provide calibration of continuous Q analysis because arterial PP analysis cannot account for unmeasured variables such as the changing compliance of the vascular bed. Recalibration is recommended after changes in patient position, therapy or condition. The Q value derived from cold-saline thermodilution is used to calibrate the arterial PP contour, which can then provide continuous Q monitoring. The PiCCO algorithm is dependent on blood pressure waveform morphology mathematical analysis of the PP waveform , and it calculates continuous Q as described by Wesseling and colleagues. Transpulmonary thermodilution allows for less invasive Q calibration but is less accurate than PA thermodilution and requires a central venous and arterial line with the accompanied infection risks. Lithium chloride dilution uses a peripheral vein and a peripheral arterial line. It estimates cardiac output Q using a standard arterial catheter with a manometer located in the femoral or radial artery. The device consists of a high-fidelity pressure transducer, which, when used with a supporting monitor Vigileo or EV monitor , derives left-sided cardiac output Q from a sample of arterial pulsations. The device uses an algorithm based on the Frankâ€”Starling law of the heart , which states pulse pressure PP is proportional to stroke volume SV. The equation in simplified form is:

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3: Home - Dr Abdul-Majeed Salmasi

CARDIAC OUTPUT AND REGIONAL FLOW IN HEALTH AND DISEASE. Developments in Cardiovascular Medicine Cardiac Output and Regional Flow in Health and Disease.

Specializations[edit] All cardiologists study the disorders of the heart, but the study of adult and child heart disorders are through different training pathways. Therefore, an adult cardiologist often simply called "cardiologist" is inadequately trained to take care of children, and pediatric cardiologists are not trained to take care of adult heart disease. The surgical aspects are not included in cardiology and are in the domain of cardiothoracic surgery. For example, coronary artery bypass surgery CABG , cardiopulmonary bypass and valve replacement are surgical procedures performed by surgeons, not cardiologists. However the insertion of stents, pacemakers are performed by cardiologists Adult cardiology[edit] Cardiology is a specialty of internal medicine. To be a cardiologist in the United States , a three-year residency in internal medicine is followed by a three-year fellowship in cardiology. It is possible to specialize further in a sub-specialty. Recognized sub-specialties in the United States by the ACGME are cardiac electrophysiology , echocardiography , interventional cardiology , and nuclear cardiology. Cardiac electrophysiology Cardiac electrophysiology is the science of elucidating, diagnosing, and treating the electrical activities of the heart. The term is usually used to describe studies of such phenomena by invasive intracardiac catheter recording of spontaneous activity as well as of cardiac responses to programmed electrical stimulation PES. These studies are performed to assess complex arrhythmias , elucidate symptoms, evaluate abnormal electrocardiograms , assess risk of developing arrhythmias in the future, and design treatment. These procedures increasingly include therapeutic methods typically radiofrequency ablation , or cryoablation in addition to diagnostic and prognostic procedures. Other therapeutic modalities employed in this field include antiarrhythmic drug therapy and implantation of pacemakers and automatic implantable cardioverter-defibrillators AICD. Sometimes a series of EPS drug trials must be conducted to enable the cardiologist to select the one regimen for long-term treatment that best prevents or slows the development of VT or VF following PES. Such studies may also be conducted in the presence of a newly implanted or newly replaced cardiac pacemaker or AICD. Clinical cardiac electrophysiology Clinical cardiac electrophysiology is a branch of the medical specialty of cardiology and is concerned with the study and treatment of rhythm disorders of the heart. Cardiologists with expertise in this area are usually referred to as electrophysiologists. Electrophysiologists are trained in the mechanism, function, and performance of the electrical activities of the heart. Electrophysiologists work closely with other cardiologists and cardiac surgeons to assist or guide therapy for heart rhythm disturbances arrhythmias. They are trained to perform interventional and surgical procedures to treat cardiac arrhythmia. The training required to become an electrophysiologist is long and requires 7 to 8 years after medical school in the U. Three years of internal medicine residency, three years of Clinical Cardiology fellowship, and one to two in most instances years of clinical cardiac electrophysiology. Cardiogeriatrics Cardiogeriatrics or geriatric cardiology is the branch of cardiology and geriatric medicine that deals with the cardiovascular disorders in elderly people. Cardiac disorders such as coronary heart disease including myocardial infarction, heart failure, cardiomyopathy, arrhythmias as atrial fibrillation and others are common and are a major cause of mortality in elderly people. Vascular disorders such as atherosclerosis and peripheral arterial disease cause significant morbidity and mortality in aged people. Echocardiography Echocardiography uses standard two-dimensional, three-dimensional, and Doppler ultrasound to create images of the heart. Echocardiography has become routinely used in the diagnosis, management, and follow-up of patients with any suspected or known heart diseases. It is one of the most widely used diagnostic tests in cardiology. It can provide a wealth of helpful information, including the size and shape of the heart internal chamber size quantification , pumping capacity, and the location and extent of any tissue damage. An echocardiogram can also give physicians other estimates of heart function, such as a calculation of the cardiac output, ejection fraction, and diastolic function how well

the heart relaxes. Echocardiography can help detect cardiomyopathies, such as hypertrophic cardiomyopathy, dilated cardiomyopathy, and many others. The use of stress echocardiography may also help determine whether any chest pain or associated symptoms are related to heart disease. The biggest advantage to echocardiography is that it is not invasive does not involve breaking the skin or entering body cavities and has no known risks or side effects. Interventional cardiology Interventional cardiology is a branch of cardiology that deals specifically with the catheter based treatment of structural heart diseases. Andreas Gruentzig is considered the father of interventional cardiology after the development of angioplasty by interventional radiologist Charles Dotter. A large number of procedures can be performed on the heart by catheterization. This most commonly involves the insertion of a sheath into the femoral artery but, in practice, any large peripheral artery or vein and cannulating the heart under X-ray visualization most commonly fluoroscopy. The main advantages of using the interventional cardiology or radiology approach are the avoidance of the scars and pain, and long post-operative recovery. Additionally, interventional cardiology procedure of primary angioplasty is now the gold standard of care for an acute myocardial infarction. It involves the extraction of clots from occluded coronary arteries and deployment of stents and balloons through a small hole made in a major artery, which has given it the name "pin-hole surgery" as opposed to "key-hole surgery". Pediatric cardiology[edit] Helen B. Taussig is known as the founder of pediatric cardiology. She became famous through her work with Tetralogy of Fallot , a congenital heart defect in which oxygenated and deoxygenated blood enters the circulatory system resulting from a ventricular septal defect VSD right beneath the aorta. This condition causes newborns to have a bluish-tint, cyanosis , and have a deficiency of oxygen to their tissues, hypoxemia. She worked with Alfred Blalock and Vivien Thomas at the Johns Hopkins Hospital where they experimented with dogs to look at how they would attempt to surgically cure these "blue babies. Congenital cyanotic heart diseases is where something is wrong with the heart of a newborn and it is not oxygenating the blood efficiently. Tetralogy of Fallot Tetralogy of Fallot[edit] Tetralogy of Fallot is the most common congenital heart disease arising in 1â€”3 cases per 1, births. The cause of this defect is a ventricular septal defect VSD and an overriding aorta. These two defects combined causes deoxygenated blood to bypass the lungs and going right back into the circulatory system. The modified Blalock-Taussig shunt is usually used to fix the circulation. This procedure is done by placing a graft between the subclavian artery and the ipsilateral pulmonary artery to restore the correct blood flow. Pulmonary Atresia[edit] Pulmonary Atresia happens in 7â€”8 per , births and is characterized by the aorta branching out of the right ventricle. This causes the deoxygenated blood to bypass the lungs and enter the circulatory system. Surgeries can fix this by redirecting the aorta and fixing the right ventricle and pulmonary artery connection. There are two types of pulmonary atresia, classified by whether or not the baby also has a ventricular septal defect. This type of pulmonary atresia is associated with complete and intact septum between the ventricles. This type of pulmonary atresia happens when a ventricular septal defect allows blood to flow into and out of the right ventricle. The surgeries that can be done to fix this defect can vary due to the different physiology and blood flow in the defected heart. One way it can be cured is by a VSD closure and placing conduits to restart the blood flow between the left ventricle and the aorta and between the right ventricle and the pulmonary artery. Another way is systemic-to-pulmonary artery shunt in cases associated with pulmonary stenosis. Transposition of Great Arteries[edit] Dextro-transposition of the Great Arteries There are two different types of transposition of the great arteries , Dextro-transposition of the great arteries and Levo-transposition of the great arteries , depending on where the chambers and vessels connect. Dextro-transposition happens in about 1 in 4, newborns and is when the right ventricle pumps blood into the aorta and deoxygenated blood enters the blood stream. The temporary procedure is to create an atrial septal defect ASD. A permanent fix is more complicated and involves redirecting the pulmonary return to the right atrium and the systemic return to the left atrium, which is known as the Senning procedure. The Rastelli procedure can also be done by rerouting the left ventricular outflow, dividing the pulmonary trunk, and placing a conduit in between the right ventricle and pulmonary trunk. Levo-transposition happens in about 1 in 13, newborns and is characterized by the left

ventricle pumping blood into the lungs and the right ventricle pumping the blood into the aorta. This may not produce problems at the beginning, but will eventually due to the different pressures each ventricle uses to pump blood. Switching the left ventricle to be the systemic ventricle and the right ventricle to pump blood into the pulmonary artery can repair levo-transposition. Persistent Truncus Arteriosis[edit] Persistent truncus arteriosus is when the truncus arteriosus fails to split into the aorta and pulmonary trunk. This occurs in about 1 in 11, live births and allows both oxygenated and deoxygenated blood into the body. The repair consists of a VSD closure and the Rastelli procedure. The surgical repair varies depending on the severity of the disease. To become a pediatric cardiologist in the United States , one must complete a three-year residency in pediatrics, followed by a three-year fellowship in pediatric cardiology.

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4: Cardiac output - Wikipedia

Cardiac Output and Regional Flow in Health and Disease by A-M. Salmasi Cardiac output has always been a subject of interest to both clinicians and researchers in different branches of medicine and surgery.

Email Maternal cardiac disease complicating a pregnancy occurs in approximately 1 to 3 percent of pregnancies. The etiology of the cardiac disease includes congenital defects, rheumatic heart disease, cardiomyopathy and ischemic disease. The prevalence of these etiologies varies by region, with rheumatic heart disease still the most common concern in the developing world. However, in the United States, declining cases of rheumatic heart disease and improved survival of patients with congenital heart disease have resulted in congenital defects being the most common cause of maternal heart disease affecting pregnancy. The cardiovascular changes during pregnancy superimposed on the altered physiology of many congenital defects can lead to maternal and fetal complications and require expert management and evaluation during the antepartum, peripartum and postpartum periods. A multidisciplinary team approach is optimal, with participation from congenital cardiology, cardiac surgery, maternal and fetal medicine, anesthesiology, and neonatology. The hemodynamic changes during pregnancy are significant and begin early in gestation. Heart rate, stroke volume, afterload, preload and contractility are all affected, with heart rate increases occurring as early as two weeks after conception. Increases in heart rate, stroke volume, preload and contractility combined with a drop in afterload result in increased cardiac output throughout pregnancy. The most significant increase in cardiac output occurs during the first two trimesters. Cardiac structure is also altered by pregnancy, with increased ventricular wall thickness and ventricular mass noted. Overall, blood volume increases by approximately 40 percent, and cardiac output by about 45 percent during gestation. Labor and delivery require additional alterations in cardiac physiology, including a further increase in cardiac output by 30 percent during contractions. Maternal and fetal outcomes of a pregnancy complicated by maternal cardiac disease depend on the interaction of the physiology of the specific cardiac lesion with the altered cardiac physiology of pregnancy. While many women with cardiac disease can complete a pregnancy successfully, there are cardiac conditions that pose a high risk of maternal mortality, so pregnancy is contraindicated for these women. Prospective multicenter study of pregnancy outcomes in women with heart disease. Number of predictors and percentage of pregnancies Cardiac event rate: Number of predictors and percentage of pregnancies Adapted from Siu SC, et al. Many cardiac conditions, including those with outflow obstruction, cause increased risk to the mother and fetus but are not absolutely contraindicated. Therefore, a risk model has been developed by Canadian investigators to appropriately advise patients regarding risk of cardiac complication during pregnancy. It was published in Circulation in Ideally, mothers should seek consultation prior to pregnancy to best understand their cardiac risk and develop a plan for care during gestation and delivery. Cardiac care during the pregnancy may include starting or adjusting cardiac medications, utilizing catheter-based procedures, or even undergoing cardiac surgery. A review of patients undergoing cardiopulmonary bypass during pregnancy at Mayo Clinic demonstrated a fetal loss rate of 21 percent. Fetal loss was associated with emergency cardiac surgery, early gestational age and maternal comorbidities. The risk of pregnancy in patients with complex anatomy and single ventricle physiology is not easily assessed, but successful pregnancies are reported in this cohort of patients with the most severe congenital heart diseases. Use of the Fontan procedure The Fontan procedure, a surgical intervention that directs caval blood flow to the pulmonary arteries, is used to palliate patients with single ventricle physiology. Patients with Fontan physiology are preload dependent, and it can be difficult to significantly increase cardiac output. These patients have an increased incidence of atrial arrhythmias and intracardiac thrombi, impacting their ability to complete a pregnancy without complications. A recent multicenter retrospective study of 71 pregnancies in patients after a Fontan, published in the Journal of the American College of Cardiology in , demonstrated a 73 percent live birth rate, with a high rate of preterm delivery average gestational age of 34 weeks. Maternal cardiac complications occurred in 37

percent and obstetrical complications in 52 percent of these pregnancies. There was no maternal mortality during pregnancy, but it was unclear from these data if long-term survival is affected. There is an increased risk of fetal congenital cardiac disease in the offspring of a parent with a congenital heart defect. Therefore, pregnancy management should include evaluation of the fetus for cardiac abnormalities. Fetal echocardiography is an excellent tool that can be utilized optimally at 18 to 22 weeks gestation for delineation of fetal cardiac anatomy. Case study At Mayo Clinic, a year-old woman presented at 11 weeks gestation for a second opinion on the risk of continued pregnancy. A murmur had been heard two weeks prior to the consultation during an office visit for an upper respiratory tract infection. Further investigation with echocardiography demonstrated severe aortic valve stenosis with a bicuspid aortic valve. The ascending aortic dimension was normal, as was the left ventricular systolic function. The patient was active and asymptomatic, having delivered a healthy term infant 15 months prior. Termination of the current pregnancy had been advised at another institution. Using the risk model, specialists felt that the patient had approximately a 30 percent risk of cardiac complication during pregnancy. It was emphasized to the patient that the risk of death was low. The patient elected to continue the pregnancy with close observation. The patient was seen regularly by maternal-fetal medicine and congenital cardiology. At 20 weeks gestation, a fetal echocardiogram demonstrated fetal situs inversus without evidence of other structural heart disease. The patient was seen in consultation with pediatric cardiology and neonatology. The pregnancy progressed without symptoms. In the third trimester, the patient met with anesthesia and a delivery plan was developed. The patient relocated to Rochester, Minnesota, at 37 weeks gestation to be near the delivery medical center. At 39 weeks gestation, spontaneous labor occurred and a healthy infant was delivered. The case demonstrates the importance of cardiac consultation with a specialist in the care of pregnancy complicated by maternal cardiac disease to appropriately assess risk and develop a multidisciplinary approach to improve the odds of successful maternal and fetal outcomes.

5: Cardiology - Wikipedia

This book deals with all relevant aspects of cardiac output in eight parts: part one describes the methods of measuring cardiac output and a comparison between the catheterisation based and the.

6: Advanced circulatory system physiology | Health and medicine | Khan Academy

Regional blood flow Cardiac output has always been a subject of interest to both clinicians and researchers in different branches of medicine and surgery. In the last decade more attention has also been paid to its application in pediatrics, neonatology, fetal medicine and pregnancy.

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