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Welcome…….

Welcome to the first issue of AWAKENINGS. In this, and future issues, we are excited for the opportunity to review journal articles and pathologies that are relevant to our staff and colleagues. We also plan to share events and news that involves our staff. Please let us know what you’d like to see in AWAKENINGS, because we welcome the opportunity to work with other departments in sharing information that will help us better care for our patients. You may e-mail your suggestions for subjects you’d like to see included in the newsletter to maultman@uabmc.edu.

Anesthesia and the Diabetic Patient

By Myra Aultman and Gwen Boyd

Diabetes Mellitus is present in many of the patients treated at CEFH. Diabetic retinopathy occurs in 80% to 90% of patients who have had IDDM for at least 20 years. Diabetes Mellitus is a chronic systemic disease that is characterized by disturbed glucose metabolism resulting in inappropriate hyperglycemia.1 Type I Diabetes, formerly called Juvenile Onset diabetes, results when the pancreas no longer secretes insulin, and is believed to be an autoimmune disease in genetically susceptible individuals, although rarely seen within members of the same family. Type II diabetes is characterized by insulin resistance. The incidence of Type II is increasing at an alarming rate and expected to double in the next few years. Onset of Type II is related to physical inactivity and obesity with a strong familial relationship. The hyperglycemia in Type II diabetic patients is treated with increased activity, a diet that prevents obesity, oral hypoglycemic drugs, and the administration of exogenous insulin in later stages.

Diabetic patients experience a 2- to 3-fold increase in perioperative cardiovascular morbidity and mortality rates. Moreover, compared with nondiabetic subjects, diabetic patients are more apt to be bradycardic and hypotensive during general anesthesia and less apt to be tachycardic or hypertensive during intubation or extubation.2 The autonomic denervation of the diabetic heart resembles that of the transplanted heart in that these patients do not respond to atropine and epinephrine is needed for the treatment of bradycardia. Diabetic patients with autonomic dysfunction are at risk for ventricular arrhythmias, especially those patients presenting with a prolonged QT interval. Autonomic neuropathy, which is a possible symptom of autonomic dysfunction, may also explain the “silent” MI experienced by diabetic patients. It has been suggested that the ischemia that occurs in a diabetic patient will not cause pain due to a failed signal transmission from the thalamus to the frontal cortex secondary to a dysfunction of afferent cardiac autonomic nerve fibers.3 In addition, the stomach also becomes denervated, with resultant gastroparesis and markedly delayed emptying causing an increased risk for aspiration.

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Peripheral neuropathies are prevalent in the diabetic patient due to the association with low plasma concentrations of insulin. Chronic hyperglycemia is associated with the loss of myelinated and unmyelinated nerve fibers. Sites of external pressure, such as the peroneal nerve at the neck of the fibula or the ulnar nerve at the elbow, can cause isolated peripheral nerve lesions. It is possible that diabetic patients may be more susceptible to peripheral nerve injury secondary to compression caused by positioning during surgery.

Preoperatively, management of hyperglycemia and electrolyte disturbances is important because the most serious acute metabolic complication of diabetes is ketoacidosis. Therefore, a serum glucose and electrolyte panel must be current prior to elective surgery. A careful history with emphasis on questions about exercise tolerance fatigue, and dyspnea is extremely important because the most common cause of preoperative morbidity and mortality in diabetic patients is coronary artery disease. Questions about peripheral sensory neuropathy, renal failure, and systemic hypertension are important because the presence of these symptoms suggests the likelihood of autonomic neuropathy and autonomic dysfunction. The incidence of sudden death syndrome is increased in the presence of autonomic dysfunction.4, 5

The management of the intraoperative anesthetic may be affected by the cardiovascular lability observed in these patients during induction, intubation, and extubation. Bradycardia and hypotension that develop suddenly and are unresponsive to atropine or ephedrine may need to be treated promptly with intravenous epinephrine in repeated doses of 10 µg.6

Serum glucose levels should be checked every 2 hours during surgery. In his chapter on Special Anesthetic Considerations, Stoelting states that “maintenance of blood glucose concentrations in the range of 80 to 110 mg/dL in critically ill patients leads to improved outcomes in terms of the incidence of bacteremia and acute renal failure, as well as hospital mortality”.7 While the patients treated at CEFH are not critically ill, there may be an association between better anesthesia outcomes and tighter glycemic control. At CEFH, many of the surgical procedures are less than two hours which explains why it is so important that serum glucose be monitored upon arrival to the PACU. However, it is not uncommon for a patient to wait for more than two hours prior to the surgery. Therefore, the anesthesia team is very concerned in following the serum glucose levels in these NPO and diabetic patients upon arrival to the hospital and during admission to the pre-operative holding area. According to the CEFH protocol for diabetic patients, if the serum glucose is greater than 300 mg/dL, treatment with intravenous insulin and a monitored serum glucose more frequently than every two hours is initiated, which may require admission to the inpatient unit, causing a delay of surgery for that patient while other patients may then use that holding area slot. When the anesthesia staff is notified that a patient with serum glucose of close to or more than 300 mg/dL has arrived at the hospital, measures can be taken to begin management of the patient in an attempt to prevent complications of hyperglycemia during the patient’s admission as well as prevent extended delays in the surgical schedule. Hypoxic brain injury is significantly greater during hyperglycemia than euglycemia. Rapid swings in blood glucose levels are associated with deleterious osmotic changes in the brain.

The multisystem manifestations of diabetes will be discussed further in subsequent issues of Awakenings. Suggestions for diabetes related topics are welcomed.

Monitoring of Neuromuscular Blockade at the P6 Acupuncture Point Reduces the Incidence of Postoperative Nausea and Vomiting

Michael Arnberger, M.D., Karin Stadelmann, M.D., Petral Alischer, M.D., Regina Ponert, M.D., Andrea Melber, M.D., Robert Greif, M.D., M.M.E. Unibe

The authors described an acupuncture point named P6 as being located proximal to the distal skin crease of the wrist, in the anterior antebrachial region on the ulnar side of the wrist. The study group consisted of 220 adult women undergoing gynecologic laparoscopic surgery. The authors stated that these women showed a marked reduction in PONV when intraoperative stimulation of the P6 was performed with a nerve stimulator.

The control group and the treatment group were stimulated by the same current and mode, but in different locations on the arm. The patients were induced with sodium thiopental, fentanyl, and rocuronium. Additional rocuronium was given as needed during the surgery and was reversed at the end of surgery with glycopyrrolate and neostigmine.

The conclusion by the authors was that intraoperative transcutaneous electrical stimulation of the P6 acupuncture point with a conventional nerve stimulator significantly reduced the incidence of PONV over 24 hours. P6 had 45% and standard location 61%. They suggested that it would be an excellent addition to the current management of PONV.
Featured Drug: **Dexmedetomidine (Precedex®)**

The Ophthalmic Anesthesia Society website recently featured a power point presentation by Mark Allan Feldman, MD of the Cole Eye Institute at the Cleveland Clinic Foundation on the drug Dexmedetomidine. In this presentation, Dr. Feldman contrasted the clinical effects of four commonly used classes of drugs used for sedation during ophthalmic procedures. He stated that dexmedetomidine, an alpha-2 agonist and could be compared to opioids such as fentanyl, benzodiazepines such as midazolam, and sedatives/hypnotics such as propofol.

The suggested advantage of dexmedetomidine over the other classes of drugs was its short half life, its combined sedative and analgesic properties, and its lack of respiratory depression.

Clinically dexmedetomidine is the only drug of the four classes which can independently provide the following clinical effects: anxiolysis, analgesia, stimulate a natural sleep, promote arousability during sedation, and promote respiratory stability. In the past, these results have been obtained by combining two or more classes or drugs.

The biggest disadvantages attributed to dexmedetomidine are its cost as well as the incidence of bradycardia and hypotension.

Since this drug stimulates a natural sleep and allows an easily arousable patient, any noise or movement around the patient will cause the patient to “awaken”. While this effect may be very helpful during ophthalmic plastic cases, it would probably be undesirable during retina cases. Therefore, careful OR staff education to eliminate loud noises or movement around the patient during the procedure would be advantageous.

One dosing plan recommended by Dr. Feldman was:

- Mix 100 mcg. Dexmedetomidine in 50 ml of normal saline
- Administer a loading dose of 1 mcg/kg/hr (lean body weight) via infusion pump over 10-20 minutes.
- Decrease the infusion rate to 0.2 mcg/kg/hr and wait 3-5 minutes.
- Administer a retrobulbar block
- Continue the infusion rate in the O.R. if indicated
- Stop the infusion 15-30 minutes prior to the end of the procedure.

Currently, Dexmedetomidine costs $55.00 for a two ml (200 mcg.) ampule.

Dexmedetomidine is currently approved by the FDA only for ICU sedation. However, it has been used extensively in “off label uses” such as awake craniotomies, and is now being recommended for awake intubation and ophthalmic anesthesia.

For more information, the power point presentation may be viewed on the following web site: [www.eyeanesthesia.org](http://www.eyeanesthesia.org)