Delayed pressure urticaria (DPU) is an uncommon form of chronic urticaria that manifests itself 1 to 12 hours after a pressure stimulus. Wheals commonly develop on the hands, feet, trunk, buttocks, legs, and face. Lesions due to DPU occur in the deep dermis layer, resulting in angioedema that may last for up to 72 hours. This angioedema is caused by the same pathogenic mechanisms as chronic urticaria; however, because of the depth of tissue involved, major manifestations occur. The DPU lesions are associated with flulike symptoms and arthralgia. All patients who experience DPU should avoid pressure on their skin. This form of urticaria is of particular interest to the anesthetist because the associated angioedema can manifest as laryngeal angioedema. The combination of the delayed onset and associated laryngeal edema could prove catastrophic for those with this disease.

Case Summary
One week prior to an elective laparoscopic cholecystectomy, the surgeon consulted the anesthesia care team regarding an upcoming patient with DPU. After consultation with the anesthesia care team the operative schedule was manipulated to allow this 52-year-old woman to be the first case of the day. This decision was made to allow maximum anesthesia staff availability for follow-up assessment later in the afternoon. All postoperative healthcare providers were informed the peak manifestation of symptoms for DPU is 12 hours.

Preoperative anesthesia assessment revealed allergies to sulfonamides yielding hives and codeine causing angioedema. Medications included lisinopril, omeprazole, multivitamin, and prednisone as needed. Upon further questioning, the patient stated that she took 5 mg of prednisone “when she had flare-ups” of the urticaria. Prednisone, 40 mg/d, had been ordered by the surgeon for the previous 3 days. Operative history included 2 cesarean deliveries and a tonsillectomy/adenoidecctomy. No anesthetic complications occurred with those procedures; however, both procedures occurred prior to her development of DPU.

Assessment of the airway revealed a class II Mallampati score, with greater than 3 fingerbreaths thyromental distance and an adequate mouth opening. Natural dentition was intact, and full cervical range of motion was demonstrated. Results of laboratory studies were all within normal limits, with the exception of a blood glucose reading of 150 mg/dL. The patient’s height was 162 cm and her weight was 85 kg. The patient’s preoperative vital signs were as follows: blood pressure, 147/64 mm Hg; heart rate, 95/min; skin temperature, 36.2°C; and room air oxygen saturation (SpO₂), 98%. Medical history was notable for hypertension. She claimed activity tolerance greater than 4 metabolic equivalents. A 12-lead electrocardiogram (ECG) was performed, revealing normal sinus rhythm with t-wave inversion in leads III and aVR. A physical status III was assigned secondary to the debilitating nature of the patient’s DPU, hypertension, and ECG abnormalities.

A 20-gauge intravenous (IV) catheter was then inserted. Pressure related to standard tourniquet application was avoided using ultrasound guidance. Continuous arterial pressure monitoring was offered to the patient to avoid sphygmomanometer use. She explained that blood pressure measurement did not cause problems previously, so continuous arterial pressure monitoring was not performed.

After arrival of the surgeon and preoperative verification by the circulating nurse, the patient was given 25 mg of diphenhydramine, 10 mg of dexamethasone, 1 g of cefazolin sodium (Ancef), and 2 mg of midazolam. Hydrocortisone at a dose of 50 mg was planned by the

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anesthesia care team. However, 100 mg was given secondary to the surgeon’s desire to give 1.5 mg/kg of prednisone. Education was provided for the patient regarding possible sequelae related to DPU, including necessary intraoperative blood pressure monitoring and airway edema secondary to intubation.

The patient was transported to the operating room and blood pressure, pulse oximeter, and ECG leads were subsequently applied. The patient was preoxygenated with 100% oxygen for 5 minutes while positioned for comfort. This positioning included removing all surgical attire (blankets were provided for warmth and modesty), deferring use of any sequential compression device, and positioning the extremities in a neutral position on foam padding. After oral reassurance that the patient felt no pressure, IV induction commenced. Propofol (Diprivan) at 200 mg as well as 200 μg of fentanyl and 40 mg of succinylcholine were given.

Laryngoscopy was performed using a MacIntosh No. 3 blade, and a 6.5-mm internal diameter endotracheal tube was secured. Care was taken to secure the endotracheal tube and orogastric tube on the right side of the mouth without pressure on the lips. Cisatracurium (4 mg) was given yielding a train-of-4 reading of 2/4. Laparoscopic cholecystectomy was then performed, with full-body visual pressure assessment every 5 minutes. Upon coagulation of all bleeding, 30 mg of ketorolac was given as well as 4 mg of ondansetron. Train-of-4 readings of 4/4 were noted, and muscle paralysis was reversed using 1 mg of neostigmine and 0.1 mg of glycopyrrolate. The orogastric tube was then removed and the oropharynx was suctioned using a 14-French soft suction catheter. The patient responded to command, was extubated with 100% oxygen, and was transported to the postanesthesia care unit (PACU).

The PACU nurses were advised to take blood pressure readings only as often as necessary, as defined by hospital protocol and to prevent any pressure on the patient’s skin. The patient recovered without incident in the PACU.

Hospital admission for 23-hour observation was ordered by the surgeon. The patient was transferred fully alert and oriented to surroundings. The patient explained that angioedema had occurred previously after 4 hours. This edema generally developed over a 1-hour time span. She believed that she could give warning well in advance of potential airway edema. Hence, she was transferred to the hospital inpatient unit. Attending nurses were informed about the DPU and the potential for airway complications. The call light was maintained within reach of the patient at all times. Anesthesia staff visited the room at 4 and 6 hours postoperatively and reported no DPU sequelae.

Discussion

Delayed pressure urticaria manifests as erythematous, deep, local, often painful swellings that arise 1 to 12 hours after pressure has been applied to the skin. These lesions frequently last more than 24 hours. Such lesions can occur following activities of daily living such as sitting on a hard chair, using a shoulder strap, wearing a belt, running, manual labor, or sexual activity. Associated signs and symptoms can occur on an individual basis, including fever, chills, arthralgia, myalgia, elevated erythrocyte sedimentation rate, and leukocytosis. Onset of DPU is usually in the third decade of life. However, DPU can occur at any age, with the poorest prognosis for recovery in children. The sites of angioedema can include the extremities, periorbital area, lips, upper respiratory tract, and the gastrointestinal tract. In extremis, urinary outlet obstruction following sexual activity has been reported. Edema of the lips, tongue, and larynx may lead to life-threatening airway obstruction. This edema in postoperative patients would not be manifest until after discharge from the PACU. At this time emergency airway management must commence without delay. Emergency use of 0.5 mL of 1:1,000 epinephrine intramuscularly, 10 mg of chlorpheniramine intramuscularly, or 100 mg of hydrocortisone has been noted for angioedema of the throat, back of the tongue, or larynx.

The pathophysiology remains unknown. Mast cell activity has been postulated secondary to the histology of the lesions showing elevated histamine levels and subsequent mast cell depletion rendering tissue refractory to pressure. However, antihistamines have remained ineffective in treatment or prevention. Complicating the differential diagnosis is the fact that 40% of these patients also have chronic urticaria, which does respond to antihistamines. For this reason, diphenhydramine was given preoperatively to the patient described herein. Systemic glucocorticoids are indicated for treatments of exacerbations, but their use is generally avoided because of their inherent long-term toxicity. Other reported treatments include plasmapheresis, IV immunoglobulin, tranexamic acid, nonsteroidal anti-inflammatory drugs, colchicine, warfarin, dapsone, sulfasalazine, montelukast, desloratadine, nimesulide, ketotifen, oral steroids, topical steroids under occlusive dressings, and cyclosporine. Usually DPU resolves spontaneously. As with all physical urticarias, prevention of occurrence is the best course of action. There is a clear lack of DPU reports in the anesthesia literature and subsequently a lack of awareness of this condition in the anesthesia community. Anesthetists must be aware that the peak manifestation of edema symptoms can be up to 12 hours after pressure stimulus. The relative rarity of DPU results in no evidence-based guidelines for the anesthetic management of DPU. This case report is presented to offer suggestions on the perioperative management of DPU, including minimizing pressure occurrence, education of perioperative staff, and symptomatic treatment secondary to histamine release.
REFERENCES

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