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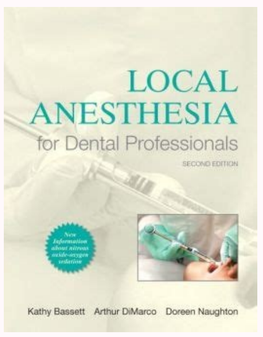

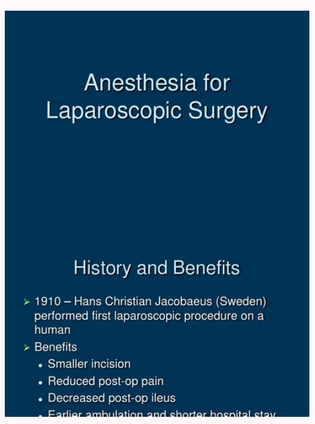

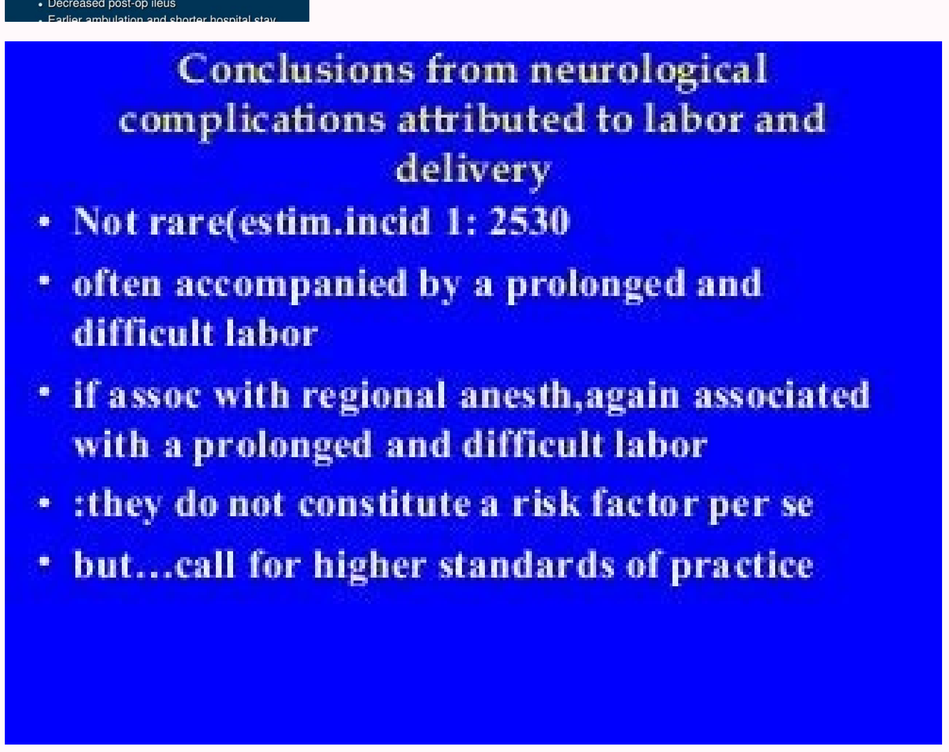

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Use of epidural anaesthesia for surgery in a patient with Kennedy's disease

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Use of neuraxial block in a patient with motor neuron disease is controversial. We describe the anaesthetic management by epidural anaesthesia of a patient with Kennedy's disease, a rare lower motor neuron disease characterized by progressive weakness and wasting of limbs and bulbar muscles. The perioperative course was uneventful, and there was no exacerbation of neurologic signs or symptoms. We suggest that a patient with Kennedy's disease may be successfully managed by epidural anaesthesia for surgical internal urethrotomy.

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Keywords: anaesthetic techniques, epidural; complications, genetic disease, X-linked; complications, Kennedy's disease; complications, motor neuron disease, lower

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Kennedy's disease is an X-linked lower motor neuron disorder characterized by progressive weakness and wasting of limbs and bulbar muscles.[1] We describe the management by epidural anaesthesia of a patient with Kennedy's disease. Searching Medline data from 1966 to May 2003 revealed no previous case reports of anaesthetic management of this disease.

Case report

A 57-yr-old, 61 kg, 163 cm, man was undergoing an internal urethrotomy for urethral stenosis. He had first noticed muscle weakness in the proximal part of the lower limbs at age 50. Six years later, he was diagnosed as suffering from Kennedy's disease. Physical examination revealed atrophy, weakness and fasciculations in the lower and upper limb muscles, and diminished deep tendon reflexes in the lower and upper extremities. He had slurred speech and slight difficulties in swallowing. Other findings included fasciculation and atrophy of the tongue and facial muscles. Gynecomastia was also apparent. Needle electromyogram (EMG) revealed large polyphasic motor units in the affected muscles, which were consistent with the diagnosis. Laboratory studies included a plasma creatine kinase concentration of 1223 u litre^{-1} (normal range 43–120 u litre^{-1}).

After detailed discussion and with the agreement of the patient, management by epidural anaesthesia was chosen. The patient was premedicated with roxatidine (H_2-blocker), 75 mg, post-orally. An epidural catheter was inserted at the L3–4 interspace and directed 5 cm cephalad. Epidural anaesthesia was established by injecting 10 ml of mepivacaine 2% via the catheter after a test dose of 3 ml of 2% mepivacaine, achieving a sensory block extending to T10. Oxygen was administered through a facemask at 5 litre min^{-1}. An additional increment of mepivacaine 2% (5 ml) was given epidurally during the operation. Throughout this period, ECG was normal, Sp_{O_2} greater than 98%, and the patient had no respiratory discomfort. The postoperative course was uneventful, and there was no exacerbation of neurologic signs or symptoms.

Discussion

Kennedy's disease is a recessive X-linked adult-onset form of motor neuron disease that is linked to a CAG repeat enlargement within the first exon of the androgen receptor gene.[2 3] The age of onset of Kennedy's disease is in adolescence and associated with symptoms such as gynecomastia, muscle pain, and premature muscular exhaustion. The number of CAG repeats appears to be correlated with the age of onset of weakness but not with the age of onset of Kennedy's disease.[4] There is a great variability in phenotypical expression and heterogeneity in clinical presentation since the severity of Kennedy's disease is not related to the size of the mutation.[4] Therefore, the

Bupivacaine: A Review

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ABSTRACT

A review of current significant literature concerning bupivacaine hydrochloride (Marcaine) is presented with particular emphasis on clinical use in oral surgery. The major advantages compared with other presently used local anesthetics are an increased duration of action and a favorable potency to toxicity ratio.

Bupivacaine HCL (1-butyl-2', 6' pipecoloxylidide hydrochloride)* is a long acting amide local anesthetic (Fig. 1). First synthesized in 1957 by Ekenstam at A. B. Bafors Laboratories in Mölndel, Sweden, this drug has undergone trials and varying degrees of acceptance in virtually every area of local anesthetic practice.[1]

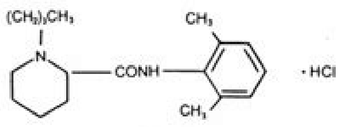

Figure 1
Chemical Structure of Bupivacaine

Mechanism of Action

The mechanism of action of bupivacaine is presumed to be the same as for other local anesthetics. Current local anesthetic theory holds that these compounds obstruct the inward flow of sodium ions through the nerve membrane, thus preventing the generation of an action potential.[2] Competitive binding to calcium sites is postulated to occur in the external lipid layer of the nerve membrane with resultant secondary interference of mobile phosphate groups. Passage of sodium ions is blocked by preventing molecular membrane reconfiguration from the resting (sodium impermeable) to the active (sodium permeable) state.

The increased duration of action of bupivacaine is ascribed to its affinity for nerve tissue.[3]

Clinical Use

Bupivacaine is utilized for intraoperative local anesthesia, post operative analgesia and in the treatment of chronic pain.

Bupivacaine is widely used in obstetrics. In lumbar epidural anesthesia the drug appears innocuous to mother and fetus.[4-5] The acceptable therapeutic index is largely due to the small amount of drug needed per unit time. The indications for bupivacaine in obstetrical analgesia are enhanced by the insignificant motor blockade in concentrations less than 0.5%.[6-7]

Caudal blocks with bupivacaine for vaginal delivery are more efficacious due to the increased duration of analgesia,[8-9-10] however fetal deaths have been reported secondary to paracervical block.[11] This latter method of administration is contraindicated unless epidural block is incomplete or unavailable at a given institution.

Excellent sensory anesthesia is reported with 0.5% bupivacaine epidural blocks for thoracic and abdominal surgery.[12-13] The increased duration of action postpones the patients initial request for post operative analgesics.[13] Continuous thoracic epidural infusion of 1.0% bupivacaine does not provide analgesia of greater duration than lesser concentrations of bupivacaine.[14] Furthermore, tachyphalaxis, extensive segmental spread, urinary retention, high plasma drug concentrations, and inadequate operative anesthesia may occur.

Intraoperative anesthesia by intercostal injection of bupivacaine is effective,[15-16-17] with a duration of four [15] to five[16] hours.

Bupivacaine combined with 2-chlorprocaine for brachial plexus blocks provides rapid onset and an increased duration of anesthesia over 2-chloirprocaine alone.[18-19] No toxic reactions and a quiescent post operative period are reported.[18-19]

In ulnar nerve block, bupivacaine 0.25% or 0.5% provides excellent sensory and sympathetic anesthesia, but motor paralysis is not complete. Initial onset for sensory fibers in within eight minutes.[20]

For intravenous regional anesthesia, bupivacaine provides rapid onset (3-5 minutes), good muscle relaxation, and fewer toxic reactions relative to lidocaine.[21]

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*Available as Marcaine HCL, Winthrop Laboratories, New York, N.Y.

Chemically, they are either amino esters or amino amides (i.e., an aromatic, lipophilic ring connected to a hydrophilic amine group by an intermediate chain containing either an ester or amide linkage). For the treatment lubricant eye drop (4 × 1), tobramycin ophthalmic solution (4 × 1) and lanolin eye ointment (during night) supported by eye patch were used. Trismus after injection of local anesthetic. Therefore, the practitioner should be aware of the possible complications and management methods. 2010;21(6):1825-1827. 2006;53(3):98-1088.Donaldson M, Gizzarelli G, Chanpong B. DOI: 10.1016/j.cden.2010.06.01328.Brand HS, Bekker W, Baart JA. DOI: 10.14219/jada.archive.1992.000443.Blanton PL, Jeske AH, ADA Council on Scientific Affairs, ADA Division of Science. For healthy adult patients in short-term operations antihistamine-diphenhydramine (Benadryl) 50 mg 1 hour prior to the operation, moderate length (1–2 hours) operation benzodiazepine, triazolam (Halcion) 0.125–0.5 mg 1 hour before the operation triazolam, for longer duration (2–4 hours) benzodiazepine such as lorazepam (Ativan) 1–4 mg may be given 1–2 hours prior to the operation or 30–60 minutes prior for the sublingual preparation may be described and given. In order to relieve pain, topical anesthetic solutions (e.g., viscous lidocaine) may be used on affected areas. Progression of trismus to chronic hypomobility and fibrous ankylosis may be prevented by the early institution of treatment consisting of heat therapy; soft diet; prescription of analgesics, anti-inflammatory drugs, antibiotics, muscle relaxants; or physiotherapy. DOI: 10.1213/ane.0b013e318187c4b122.Chowdhary S, Bukoye B, Bhansali AM, Carbo AR, Adra M, Barnett S, et al. Allergy. 2019;23(3):1109-1119. 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Discoloration on the area, a bruise may accompany hematoma [48].From the anatomical point of view, different nerve effects cause hematoma on specific regions such as anterior superior alveolar (infraorbital) nerve block below the lower eyelid, incisive (mental) nerve block at the chin area, buccal nerve block or any palatal injection within the mouth, and posterior superior alveolar nerve block extraoral in the lower buccal region of the mandible, intraoral distal to maxillary tuberosity.Hematoma formation can be prevented by aspirating before injecting the anesthetic solution, by using a short needle and a minimum number of needle penetrations into tissues. 2016;8:35-50. Journal of Dental Anesthesia and Pain Medicine. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontics. Early treatment with prednisolone or acyclovir in Bell's palsy. 1979;48:29-3247.Fonseca RJ, Frost DE, Hersh EV, Levin LM. Sullivan et al. Paraesthesia after local anaesthetics: An analysis of reports to the FDA adverse event reporting system. Oral and Maxillofacial Surgery. For the treatment of edema produced by infection, antibiotics should be prescribed [27].Hematoma formation as a complication of local anesthesia is the result of a venous or arterial laceration; intra-arterial blood pressure increase causes effusion of blood into the surrounding soft tissues. Local anesthesia: Agents, techniques, and complications. Inflammatory diseases altering the pharmacokinetics and pharmacodynamics of local anesthetics cause a response to decrease and unfavorable effects to increase [41].Local anesthetic failure or difficulty to obtain satisfactory analgesia commonly occurs in the situations with inflammations such as pulpitis and apical periodontitis acute periodontal abscess or pericoronitis [42]. Ophthalmologic complications after intraoral local anesthesia an analysis of 65 published case reports. 2006;11(2):175 17839.Meyer FU. 2016;121(3):39-50Submitted: March 14th, 2019Reviewed: May 31st, 2019Published: July 4th, 2019© 2019 The Author(s). St Louis, Missouri: Elsevier Mosby; 2004. Common local complications associated with local anesthesia are reported as pain at injection, needle fracture, prolongation of anesthesia and various sensory disorders, lack of effect, trismus, infection, edema, hematoma, gingival lesions, soft tissue injury, and ophthalmologic complications [2, 3].This chapter is presenting the local and systemic complications associated with the local anesthetics used in oral and maxillofacial surgery. Research and Science Swiss Dental Journal. 2010;54(4):745-756. DOI: 10.2147/CCIDE.S6362610.Sekimoto K, Tobe M, Saito S. Local anesthesia—An insight. Anaphylaxis: Guidelines from the European academy of allergy and clinical immunology. They consulted the patient with the Department of Ophthalmology and the Department of Physical Therapy and Rehabilitation. Anesthesia Complications in the Dental Office. The local anesthesia should not be injected through the infected area.Injecting local anesthesia during the presence of infection is important to increase the pH of anesthetic agent in order to increase efficiency because the infected tissue is more acidic. Avoiding complications in local anesthesia induction anatomical considerations. In emergency management of anaphylaxis in the office, due to guidelines of the Australasian Society of Clinical Immunology and Allergy should be in these steps, the patient should lie flat, but also in the case of breathing difficulty, the patient is allowed to sit. New developments should be followed by the practitioners to reduce possible complications associated with the local anesthesia.1.Christopher A. 2009;7(4):270-27229.Zeltser R, Cohen C, Casap N. 2005;52(4):136-13924.Säkkinen J, Huppunen M, Suuronen R. An observational study. Initial injection pressure for dental local anesthesia: Effects on pain and anxiety. DOI: 10.1111/bcpt.12357. Clinical Oral Investigations. Paresthesia or neuralgia complication is mostly transient but may also be permanent if the anesthetic solution is injected directly into the nerve. Oral sedation: A primer on anxiolysis for the adult patient. DOI: 10.5005/jp-journals-[10024-1067]51.Jung RM, Rybak M, Milner P, Lewkowicz N. For those weighing 15 to 30 kg, the epinephrine dose is 0.15 mg. have a case report for late paralyses. Pharmacologically, mildly and moderately anxious dental patients can be managed using sedation or extremely anxious or phobic patients using general anesthesia [8, 9].Local anesthetic systemic toxicity develops when a sufficient (toxic) concentration of anesthetic drug in the blood level reaches to the central nervous system and cardiovascular systems.Initial symptoms are characterized by central nervous system signs such as excitation, convulsions, followed by loss of consciousness and respiratory arrest. 1st ed. When administered in excessive doses, the local anesthetics mostly prilocaine and benzocaine (90% of reported cases) and barely lidocaine and articaine may also lead to methemoglobinemia [21].Symptoms of cyanosis will be observed in nail beds and mucous membranes. DOI: 10.15644/asc52/2/950.Bendgude V, Akkareddy B, Jawale BA, Chaudhary S. They found that the Gow-Gates technique for mandibular block anesthesia is only associated with diplopia, vision impairment is more associated with inferior alveolar nerve blocks than with posterior superior alveolar nerve blocks, and the latter technique has rarely been reported as a cause of amaurosis. Recommendation for treatment of infection is antibiotics (penicillin V 500 mg every 6 hour for 7–10 days), analgesics, heat, drainage, and physiotherapy [2, 31, 47].Swelling of tissues can be due to trauma during injection, infection, allergy, hemorrhage, and injection of irritating solutions.The management of edema is dependent on the cause. 2014;69:1026-1045. The adrenaline dose should be based on resuscitation guidelines such as those of the American Heart Association. For the management of mild symptoms, oral or intramuscular antihistamine-diphenhydramine (Benadryl), 25 or 50 mg, should be given. International Journal of Oral Health and Medical Research. The prevention of measures and treatment of the complications is also emphasized.local anesthesiacomplicationlocal complicationssystemic complicationstreatmentLocal anesthetic agents have been used in clinical dentistry to allay or eliminate pain associated with invasive operations as early as the nineteenth century [1]. Methemoglobinemia related to local anesthetics: A summary of 242 episodes. When the needle penetrates a nerve, the patient may also feel a sudden "electric" shock, suddenly moving the head, with the risk of self-inflicted damage [24].In order to prevent discomfort, topical anesthetic application, warming anesthetics to body temperature, using a smaller-gauge needle (27 gauge), switching to a fresh needle when you have to inject multiple times in the same lesion or when you have multiple injection sites, and injecting slowly and with low pressure which reduces pain are done. Due to a numb feeling, the patient may have discomfort such as tongue biting, drooling, loss of taste, and speech impediment. 2006;72(6):559-56434.Renton T. Severe adverse reactions to dental local anaesthetics: Prolonged mandibular and lingual nerve anaesthesia. The amide group includes lidocaine, mepivacaine (Carbocaine), prilocaine (Citanest), bupivacaine (Marcaine), etidocaine (curanest), dibucaine (nupercaine), and ropivacaine (Naropin).Ester local anesthetics are not available in dental cartridges essentially because of several reasons such as the lack of efficacy, the potential for allergenicity, and the advantages of amino amides [4, 5, 6, 7].AdvertisementThis psychogenic answer is associated with either the patient's body counterbalance to an anxiety-inducing situation or due to adrenaline secreted by the vasoconstrictor agent. The Journal of Dermatology. Doses of local anesthetics should be always strictly assessed with body weight, and the maximum recommended dosages should be considered. Local anaesthesia: Risks and controversies. Antibiotics should be prescribed if the hematoma is large in order to prevent the development of a wound infection [14, 49].Gingival lesions consist of recurrent aphthous stomatitis, and herpes simplex can occur intraorally after a local anesthetic injection or after any trauma to the intraoral tissues. British Dental Journal. For 4 weeks, galvanic stimulation of the affected side of the facial nerve was performed, and mime therapy was recommended. Some authors claim using antihistamines is not effective because they are not effective on upper or lower airway obstruction, hypotension, or shock, while others advocate that these drugs decrease the side effects urticaria, flushing, headache, hypotension, and rhinorrhea. In a specific patient group, in children younger than 6 months, in pregnant women, or in patients taking other oxidizing drugs, prilocaine should not be used. Practical guide for the management of systemic toxicity caused by local anesthetics. This mostly involves nervus lingualis or nervus mandibularis or both [32]. 2012;9(2):127-13213.Meechan JG. In more severe cases, headache, dizziness, fatigue, dyspnea, and tachycardia are seen. One of the important attempts in clinical oral surgery practice is to maintain safe and effective local anesthesia. 2013;215(8):393-39935.Sullivan FM, Swan IR, Donnan PT, Morrison JM, Smith BH, McKinstry B, et al. Complications of local anesthesia used in oral and maxillofacial surgery. DOI: 10.1007/s00784-010-0442-627.Malamed SF, Reed K, Poorsattar S. Clinical, Cosmetic and Investigational Dentistry. Reasons for local anesthesia failures. Philadelphia, PA: Saunders; 200948.Baiju A, Krishnakumar K, Panayappan L. On the examination, they observed Bell's palsy sign on the left side and unilateral expressionless, and there was no pathologic sign in the wound or any herpetic lesions. Benzocaine-induced methemoglobinemia. 2011;56(2):154-159. The use of adrenaline auto-injector can also be chosen, which is carried mostly by heavy allergic patients themselves.Adrenaline should be administered for anaphylaxis by intravenous (IV) route only in the case of profoundly hypotensive patients or patients who develop a cardiopulmonary arrest or those who fail to respond to multiple doses of IM adrenaline because of the potential cardiovascular adverse effects of IV administration of adrenaline [17, 18].Estelle and Simons evaluated evidence-based pharmacologic treatment of anaphylaxis. Essentials of local anesthetic pharmacology. Lidocaine-induced methemoglobinemia: A clinical reminder. The implications of a broken needle in the pterygomandibular space: Clinical guidelines for prevention and retrieval. In the World Allergy Organization survey, glucocorticoids were reported to be the second most widely available medications (after epinephrine) for anaphylaxis treatment globally, even though some claim glucocorticoids have no proven benefit in anaphylaxis [19].As a result first step of treatment must be epinephrine additionally glucocorticoids and antihistamines may use to treat severe systemic reactions.Methemoglobinemia is a unique dose-dependent reaction where the iron in hemoglobin is stabilized in the ferric (Fe3+) form, unable to attach oxygen, leading to tissue hypoxia and causing a varying degree of cyanosis. As a guideline, methylene blue, which is a heterocyclic aromatic chemical compound increasing the rate of conversion of methemoglobin to hemoglobin, may be given to a symptomatic patient. Another recommendation for epinephrine is or children and adults who weigh 30 kg or over is 0.3 mg. 2013;173(9):771-77623.Hegedus F, Herb K. Many of the complications doubt to be allergic are actually anxiety-induced reactions [15].Ester-type local anesthetics are more allergenic than amide-type local anesthetics. Journal of the American Dental Association (1939). In most cases, needle fracture happened with 30-gauge needles and during inferior alveolar nerve block, as a result of either incorrect injection technique, improper choice of hypodermic needle magnitude, or unexpected motion of the patient or assistants [26].In order to prevent needle fracture, first the injection needles should be checked; 30-gauge and short needles should not be used for inferior alveolar nerve block in adults or children (25–27 should be chosen). A rate of 30 seconds per mL of solution is recommended. Journal of Pre-Clinical and Clinical Research. PMID:2542089637.Sambrook PJ, Goss AN. Oral surgery: Part 4. DOI: 10.1111/j.1834-7819.2011.01317.x38.Vasconcelos BC, Bessa Nogueira RV, Maurette PE, Carneiro SC. 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Ice packs should be held for the first 24 hours after surgery following which intermittent hot moist packs can be used to resolve the condition and massage therapy using a heparin cream. Den Norske Tannlaegeforenings Tidende. Additionally, hydrocortisone cream may be prescribed to relieve skin itching or erythema. 1999;26(8):344-34932.Pogrel MA. The clinical signs and symptoms usually show objective symptoms such as quick talking, flicker, and tremor in the extremities [10, 11].Predisposing factors are associated with age, weight, other drugs, gender, the presence of disease, genetics, vasoactivity, concentration, dose, route of administration, the rate of injection, vascularity of the injection site, and the presence of vasoconstrictors [7].In order to prevent systemic toxicity, the patient should be evaluated. It is important to understand the patient and make them relax. Several factors cause trismus such as multiple injections in a short period of time in the same area, intramuscular injections inside the muscle or trauma to muscles (either the lateral pterygoid muscle or the temporal muscle) which cause hematoma formation and fibrosis, needle fracture in the muscles inserting to styloid process, inaccurate positioning of the needle when giving the inferior nerve block or maxillary posterior injections or inflammation of the masseter and other masticatory muscles, a low-grade infection, and excessive volumes of local anesthetic solution deposited into a bounded region which cause expansion of tissues. An emphasis on the wide usage and important role of local anesthesia in dentistry: A strategic review. In the literature for the removal of the fragment, mostly superficial mucosal incision perpendicular to the trajectory of the needle followed by blunt supra-periosteal dissection to spare vital structures is recommended [28, 29].Acham et al. 2015;117(1):52-56. Needle breakage during local anesthesia in the oral cavity—A retrospective of the last 50 years with guidelines for treatment and prevention. The dose should be limited to 2.5 mg/kg [21].AdvertisementPain on injection can be due to specific circumstances such a temperate of the solution, velocity of injection, dull needles, needles with barbs, or aggressive insertion of the needle, damaging soft tissues, blood vessels, nerves, or the periosteum and causing more pain and other complications.The burning is dependent on the rate of injection and the acidity of the solution. If severe hypotension arrhythmia occurs, administration of the infusion of a 1.5 mL/kg 20% lipid emulsion over approximately 1 minute and then starting with continuous application at 0.25 mL/kg/min = 1000 mL/h. A concoction of identical amounts of diphenhydramine and milk of magnesia rinsed in the mouth effectively covers the ulcerations and provides relief from pain. When swelling forms immediately after injection, localized pressure should be applied with a minimum of 2 minutes. The prevalence of allergic reactions to amide group local anesthetics is rare. It is important because 27 out of 57 cannula fragments were located in the pterygomandibular space, and the choice of the removal of the fragment, whether general or local anesthesia, should be dependent on the patient's systemic condition [30].Prolonged anesthesia, paresthesia, or neuralgia may occur following dental local anesthetic blocks. Another strategy to reduce toxicity is using the guideline of 1/10th cartridge per kilo as a rough guide to the maximum dose [13].Dentists should be aware that excessive doses of topical anesthetics while these agents are more concentrated to facilitate infiltration may lead to toxic effects, particularly in children.Treatment at the office includes airway support, administration of 100% oxygen, supine positioning, and protection from injury in the event of seizure activity, treating convulsions (benzodiazepines or thiopental; propofol cannot be used in patients with unstable blood pressure, heartbeat) [14]. Allergy-induced edema treatment consists of intramuscular epinephrine injection as mentioned above and, additionally, antihistamine and corticosteroid administration and consultation with an allergist to determine the precise cause of the edema. Anesthesia Progress. 1999;181(1):105-106. Facial nerve paralysis after impacted lower third molar surgery: A literature review and case report. It is mandatory to have a preoperative evaluation of the patient and choosing the proper local anesthetic agent. International Journal of Dental Hygiene. Anesthesia and Analgesia. conducted a systematic review in 2016 on ophthalmologic complications following dental local anesthesia with 66 reports and 89 cases. Basic & Clinical Pharmacology & Toxicology. 2016;63(2):84-90. Causes of failure of dental local anaesthesia—A review. The volume of local anesthesia should be decreased, young or lightweight patients should not be treated all four quadrants at one visit using local anesthetic alone; accurate and slow injection technique, adjustment of dosage divided administration and aspirating technique, using agents with low toxicity such as ropivacaine and levobupivacaine, and performing an aspiration test are recommended [11]. This will stop the hemorrhage.Both swelling and discoloration usually subside in 10 to 15 days. 621-65553.Pandey R, Dixit N, Dixit KK, Roy S, Gaba C. Pharmacologic treatment of anaphylaxis: Can the evidence base be strengthened? Various complications including hypersensitivity, allergy, overdosage, toxicity, hematoma, trismus, paresthesia, or neuralgia can be observed during practice. In the acute phase, pain from hemorrhage leads to muscle contraction and limitation of motion.Once trismus develops, some cases will resolve spontaneously. Local anesthetic toxicity: Acute and chronic management. The American Society of Regional Anesthesia and Pain Medicine standard of

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