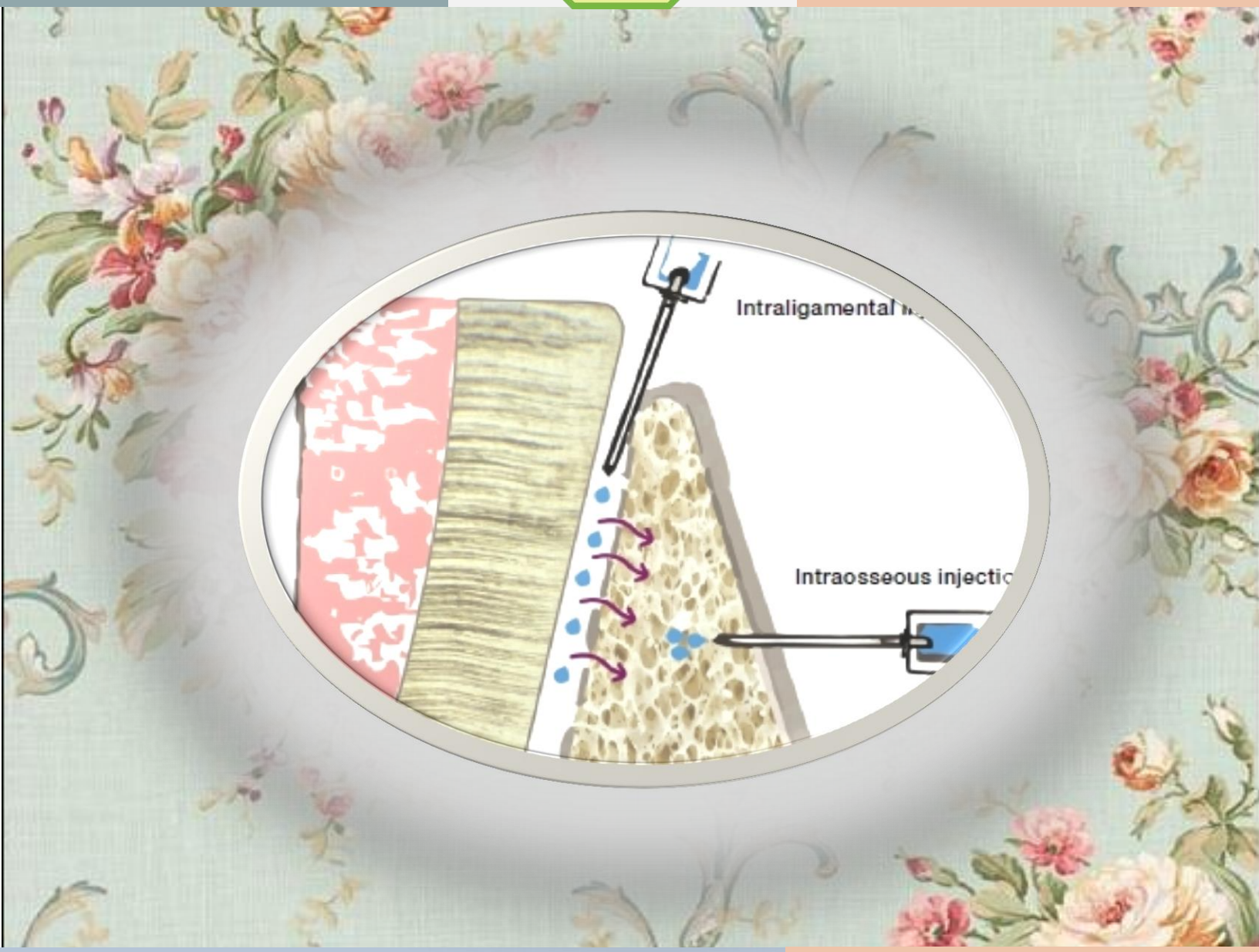
Pediatric Dentistry

4th year



Lec. 24

SUPPLEMENTAL LOCAL ANESTHETIC TECHNIQUES

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SUPPLEMENTAL LOCAL ANESTHETIC TECHNIQUES

Intra-Ligamentary Anesthesia

Intra-ligamentary or periodontal ligament (PDL) anesthesia is a very effective technique in children. This is a method of intraosseous injection with local anesthetic reaching the cancellous space in the bone via the periodontal ligament. This method allows the use of small amounts of local anesthetic solution; the technique is significantly more successful when a vasoconstrictor-containing solution is employed.

The technique

Involves inserting a 30 gauge needle at an angle of approximately 30° to the long axis of the tooth into the gingival sulcus at the mesiobuccal aspect of each root and advancing the needle until firm resistance is met. The needle will not advance far down the ligament as a 30 gauge needle is many times wider than a healthy periodontal ligament. It normally remains wedged at the alveolar crest. The solution is then injected under firm controlled pressure until 0.2 ml has been delivered. The application of the appropriate pressure is easier with specialized syringes, but the technique is equally effective with conventional dental syringes. Another advantage of specialized syringes is that they deliver a set dose per depression of the trigger (0.06-0.2 ml depending on the design). When using conventional syringes for intra-ligamentary injections the recommended dose of 0.2 ml for each root can be visualized as it is approximately the volume of the rubber plunger in the cartridge. It is important not to inject too quickly; about 15 seconds per depression of the specialized syringe lever is needed. Also, it is best to wait for about 5 seconds after the injection before withdrawing the needle. This allows the expressed solution to diffuse through the bone; otherwise it escapes via the gingival sulcus into the mouth.

Considerations:

- *Intra-ligamentary anesthesia reduces, but does not completely eliminate, the soft tissue anesthesia that accompanies regional block*

anesthesia in the mandible. This should help reduce the occurrence of self-mutilation of the lip and tongue.

- *Intra-ligamentary anesthesia is often mistakenly considered a one-tooth anesthetic. Adjacent teeth may exhibit anesthesia, and care must be taken if this method is being used as a diagnostic tool in the location of a painful tooth.*
- *There are few indications for the use of the PDL technique in the maxilla because reliable pain-free anesthesia should be possible in all regions of the upper jaw using infiltration techniques, it is best considered as a supplementary method of achieving pain control if conventional techniques have failed.*
- *The technique can be helpful in the posterior mandible and can eliminate the need for uncomfortable regional block injections.*

Intrapulpal Anesthesia

The intrapulpal injection (IPI) technique is one of the commonly employed supplemental anesthetic technique adjuvant to conventional maxillary infiltration anesthesia or mandibular inferior alveolar block in situations, where patients encounter severe pain or discomfort during pulp extirpation, especially in acutely inflamed molars. In general, the deposition of local anesthetic solution directly into the pulp chamber provides an effective anesthesia for extirpation, instrumentation, and debridement of pulpal tissues. Following access cavity preparation and deroofing of pulp chamber, IPI is administered followed by effective hemostasis. Only a small amount of local anesthetic solution (0.2–0.5 ml) is employed.

Mechanism:

The most significant factor contributing to the success of IPI is that its administration must be done under pressure. It had been suggested that the anesthetic effect of the intrapulpal technique is mainly due to the back-pressure of the solution, independent of the type of solution injected.
The precise mechanism by which pressure can induce anesthesia is incompletely understood, but it has been suggested that prolonged pressure

may lead to degeneration of nerve fibers in many instances leading to profound anesthesia for long endodontic treatment procedures, as in cases of pediatric patients.

Advantage:

- *The IPI technique serves as a useful means of overcoming failure of conventional anesthetic techniques*
- *Causes negligible systemic effects.*

The main drawback *is that the IPI by itself can be highly painful. This can be attributed to the vascular distension of the tissues, i.e., engorgement of the blood vessels.*

Recommendations:

- *Recently, it was reported that topical application of 20% benzocaine gel mixed with hyaluronidase, to the exposed pulp before the administration of IPI can reduce the intensity of pain during IPI. Hyaluronidase is an enzyme that acts by hydrolysis of hyaluronic acid, a normal component of connective tissue, thereby enhancing the diffusivity of drugs injected along with it.*
- *Shorter needles have also been recommended in an attempt to reduce pain during injection, especially for the young uncooperative patients. Therefore, a short (20 mm) or an extra shot (10 mm) 30-gauge needle can be employed in such cases.*

Intraseptal Injection

It is similar in technique to the PDL injection. Useful for providing osseous and soft-tissue anesthesia and hemostasis for periodontal curettage and surgical flap procedures.

Nerves anesthetized *– terminal nerve endings at the site of injection and in the adjacent hard and soft tissues*

Areas anesthetized *– Bone, soft tissue, root structure in the area*

Indication *– when both pain control and hemostasis are desired for soft-tissue and osseous periodontal treatment*

Contraindicated *if infection or severe inflammation at the injection site*

Advantages

1. *Lack of lip and tongue anesthesia*
2. *Minimum volumes of local anesthetic necessary*
3. *Minimized bleeding during the surgical procedure*
4. *Atraumatic*
5. *Immediate (<30-sec) onset of action*
6. *Few postoperative complications*
7. *Useful on periodontally involved teeth (avoids infected pockets)*

Disadvantages

1. *Multiple tissue punctures may be necessary*
2. *Bitter taste of the anesthetic*
3. *Short duration of pulpal anesthesia; limited area of soft-tissue anesthesia*
4. *Clinical experience necessary for success*

Intraosseous Injection

Deposition of local anesthetic solution into the interproximal bone between two teeth

Nerves anesthetized *– terminal nerve endings at the site of injection and in the adjacent soft and hard tissues*

Areas anesthetized *– Bone, soft tissue, and root structure in the area*

Indication *– pain control for dental treatment on a single or multiple teeth in a quadrant*

Contraindications *– infection or severe inflammation at the injection site.*

Recommendations

- *Because the intraosseous injection site is relatively vascular, it is suggested that the volume of local anesthetic delivered be kept to the recommended minimum to avoid possible overdose*
- *Because of the high incidence of palpitations noted when vasopressor-containing local anesthetics are used, a "plain" local anesthetic is recommended*

Advantages

- *Lack of lip and tongue anesthesia*
- *Atraumatic*

- *Immediate (<30 seconds) onset of action*
- *Few postoperative complications*

Disadvantages

- *Requires a special syringe*
- *Bitter taste of the anesthetic drug (with leakage)*
- *High occurrence of palpitations when vasopressor-containing local anesthetic is used*

Precautions

1. *Do not inject into infected tissue*
2. *Do not inject too rapidly*
3. *Do not inject too much solution*
4. *Do not use a vasopressor-containing local anesthetic unless necessary*

RECENT TRENDS IN PAIN CONTROL

Safety Syringes

- *They minimize the risk of accidental needle stick injury occurring with contaminated needle.*
- *They possess a sheath that locks over the needle when it is removed from patient's tissues.*
- ***Advantages:*** *disposable, single use, sterile until opened and lightweight.*
- ***Disadvantages:*** *more costy and may be different to use for first timers.*

Computer Controlled Local Anesthetic Delivery System

- *Introduced into dentistry in 1997*
- *Also called as Wand System*
- *Single use disposable safety handpiece*
- *Pen like grasp allows operator to rotate handpiece during penetration and insertion*
- *This system administers local anesthetic solution at 2 specific rates:*

— *Slow rate 0.5 ml/min*
— *Fast rate 1.8 ml/min*

- ***Advantages:*** *precise control of flow rate and pressure, increased tactile sensation, nonthreatening, automatic aspiration*
- ***Disadvantages:*** *it requires additional armamentarium and is costly.*

Comfort Control Syringe

- *Introduced after Wand*
- *Electronic preprogrammed delivery device*
- *Local anesthetic is deposited more slowly and consistently*
- *Consists of a two stage delivery system*

— *Injection begins at an extremely slow rate to prevent pain associated with quick delivery*
— *After 10 seconds, comfort control syringe automatically increases speed to the preprogramed rate.*