**Stainless steel crowns:**

Prefabricated crown forms which can be adapted to individual primary molars and cemented in place to provide a definitive restoration.

They are referred to preformed metal crowns

Basically it’s a metal shell with a preformed anatomy that can be adapted into the tooth

Restoration of choice for the primary molar with caries affecting more than one surface

SSCs are available for anterior and posterior teeth but mostly are used for posterior teeth.

SSC are also available for permanent molars (badly destructed 6 or child with MIH)

SSC for permanent molars are harder and more challenging to do than for primary molars

**Advantages:**

Extremely durable and superior to multi-surface fillings

Relatively inexpensive

Minimal Technique Sensitivity during placement

Offers advantage of full tooth coverage

**Indications:**

Primary molars with extensive carious lesions (we need 1mm of healthy enamel all around)

Following pulpotomy and pulpectomy procedures; Pulpally treated teeth tend to be brittle

Fractured primary molars

Developmental problems such as; amelogenesis imperfecta, enamel hypoplasia, and dentinogenesis imperfecta

Severe tooth surface loss

In patients with high caries susceptibility

An abutment for certain appliances such as space maintainers (crown and loop space maintainer)

Patients where routine oral hygiene measures are impaired (patients with special needs), because breakdown of intracoronal restoration is more likely

In patients undergoing restorative care under GA (we use the most durable restoration in this case which is SSC)

Infra-occluded primary molar

**Contraindications:**

If the primary molar is close to exfoliation with more than half of the roots are resorbed.

Patients with a known nickel allergy or sensitivity; SSC had high percentage of nickel (70%), nowadays it’s much less (9-12%)

**Rationale:**

SSCs are flexible and elastic.

Flexible: they are capable of bending easily without breaking.

Elastic: they are capable of resuming the normal shape spontaneously after distortion

If we look at the anatomy of the primary molar, we have a buccal bulge. The SSC is flexible enough so it bends over the buccal bulge. Once it goes over it, it’s capable of resuming its original shape.
We place the crown over the lingual surface first then over the buccal bulge, the SSC goes back to its original shape and becomes locked, and thus we achieve retention. That’s why we don’t prepare the buccal or lingual surface of primary teeth.

The cervical bulge is surrounded by the crown and it is important for retention.
The snap sound means good size and fit

**Clinical procedure**:

In most of the times we don’t local anesthesia.
It’s a little bit uncomfortable because we put the SS crowns subgingivally, but most children can tolerate it.
If the child couldn’t tolerate it, we can use topical anesthesia or soft tissue infiltration buccally and lingually.

Most of the time SSCs are fitted immediately following pulp treatment (the tooth is already anesthetized)

Manipulation of the gingival margin can cause some discomfort.

It is sometimes possible to use only a topical anesthetic, such as benzocaine ointment on the gingival cuff (though topical anesthetic taste can cause some discomfort for the child)

Caries removal and appropriate pulp treatment (ex; indirect pulp capping, pulpectomy or pulpotomy) should be completed if necessary.

**Preparation:**

The preparation is very simple; occlusal and interproximal reduction.

Occlusal reduction:

-Should be sufficient to avoid significant occlusal prematurity

-should follow the contours of the tooth

-is carried out to obtain clearance of approximately 1-1.5 mm

Interproximal reduction:

-is needed most of the times

-allow the SS crown to be seated beyond the maximum bulbosity of the crown

We use Fine tapered fissure bur or needle bur*.* (we don’t want a finish line to be that clear like in ceramic and PFM crowns).

It’s important to cut through the tooth away from the contact area to avoid damage to the adjacent tooth (especially when preparing an E and the 6 is already erupted, so we must be careful not to damage the 6)
Sometimes we don’t do interproximal reduction distally in order not to damage the permanent molar.

The bur should be angled away from the vertical so that a shoulder is not created at the gingival margin.

SSCs are not closely fitted; therefore the preparation doesn’t have to be precise.

The gingival finish line should be a feather edge with no ledges or steps detectable and should be approximately 1mm below the gingival margin.

If a step or ledge is present it will be difficult to seat the crown.

The preparation should be rounded off with no sharp line angles.

Buccal and lingual preparation is not necessary and may be detrimental for retention

**Crown Selection:**

The kit that we use is 3M (Upper and lower D’s and E’s, from sizes 2 to 7)

The crowns in this kit are anatomically trimmed and contoured cervically thus require little or no modification and are easy to use.

Other types of SSCs have little or no cervical contouring and routinely require extensive modification.

Choosing the correct size is assisted by measuring the mesio-distal dimensions of the tooth, or contralateral tooth, with divider or a graduated periodontal probe. But most of the times you try it clinically, you look at the tooth and try a crown if it doesn’t fit, you try another one until you find the correct size.

Crown should be placed lingually and rolled over the preparation to the buccal margin (it’s written on the buccal side of the crown whether it’s an upper or lower crown; that’s how we can differentiate between both sides)

A crown will often make an audible “click” as it springs into place over the gingival undercut area.

Firm pressure is usually needed to seat the crown.

The marginal gingiva will blanch somewhat with a well-fitting crown as it seats.

The crown margin should be located approximately 1 mm subgingivally both to give retention and a good cement seal.

If excessive gingival blanching is seen the crown might need to be trimmed.

Trimming can be done with crown scissor or abrasive wheel.

It may be helpful to stripe a line on the crown along the gingival contour with a sharp explorer, and then the crown should be trimmed 1mm below the line.

Work away from the patient’s face with proper eye protection.

The edges are then smoothened and polished with an abrasive wheel.

After trimming, the crown will have cervical opening, so it must be crimped by crimping plier to regain its retentive contour.

Although it has been customary to recommend trimming of crowns where gingival blanching occurs, there is no evidence that this practice reduces post cementation complications.

A lot of times we accept the crown even if there is a gingival blanching, patient will get adapted to the crown.

Over trimming of the crown margin should be avoided, as this may affect retention if it results in reduced adaptation of the crown margin into undercut area.

**Cementation:**

Resin bonded cement is the best (highest tensile bond strength, retention and least microleakage)

The next best luting agent is resin modified glass ionomer used in conjunction with the bonding agent

RMGI and resin bonded cement need good isolation, multiple steps and a cooperative patient

Conventional glass ionomer cement comes next

The least effective cement is zinc polycarboxylate

SSCs are not a tight fit except at the margin, so a larger than normal volume of cement should be mixed

As the crown is seated over the tooth, excess cement should be seen to flow out from the margins.

If excess cement is absent from the margins, it is an indication of an inadequate volume of cement which may lead to early failure of the crown.

Mirror handle or band pusher may be used for complete seating.

All excess cement should be carefully removed and a piece of knotted dental floss used to remove excess cement interproximally.

**Occlusion:**

The primary dentition has the ability to adjust to a slightly opened bite of 1 mm or so over a few weeks with no adverse effect.

The occlusion returns to pretreatment level after 15-30 days

Crown length will be reduced (intrusion will happen) after 15-30 days

The patient should be advised that there may be some temporary gingival discomfort. You can tell the parent to give the child Revanin in case of discomfort, bus most of time they don’t need it.

**Gingival Condition:**

Studies have failed to show any increase in supra-gingival plaque accumulation associated with SSCs except in instances where crowns with defective margins have been placed, or where excess cement has been retained.

**Special considerations:**

Where a primary molar has no adjacent tooth either mesially or distally, it’s still important to carry out approximal reduction to avoid producing an excessive marginal overhang.
This is particularly important on the distal surface of second primary molars where such overhangs can impede the eruption of the first permanent molar

When multiple crowns are to be placed in the same quadrant, there might be a problem of space loss due to proximal caries
So the adjacent proximal surfaces of the teeth should be reduced slightly more than usual to facilitate placement of the crowns
Moderate reduction in mesio-distal dimension can be attempted by flattening of the mesial and distal contact areas of the crown with Adam’s pliers.
Another option in the lower teeth is to choose the upper SSCs but opposing side. (Same gingival contour, but the upper is smaller mesio-distally and most of the time it will fit in the lower teeth)

**Esthetics:**

Only around 5% of parents object about appearance.

SSCs may be improved esthetically by placement of composite resin in a buccal window cut into the labial surface of the crown after fitting.

Pre-veneered stainless steel crowns:
-expensive
-more preparation is needed due to their greater bulk
-can’t be crimp (may lead to crazing and thus become more susceptible to fracture)
-chipping over time
-prone to fracture over time

Pre-fabricated zirconia crowns:
-very expensive
-for primary anterior teeth mainly
-highly aesthetic
-technique sensitive
-can cause attrition for the lower permanent centrals, because lower centrals erupt before the exfoliation of the upper A’s

**The Hall Technique:**

It’s a method for managing carious primary molars were decay is seen under preformed metal crowns without local anesthesia, tooth preparation or any caries removal

Many clinicians find SSCs difficult to fit using the conventional approach including preparation with local anesthesia and a high level of patient cooperation.
For these and other reasons, SSCs are not widely used in UK (less than 1% of restorations are SCC)

It’s a new technique, first reported in 2006. In this technique SSCs are cemented on a primary molar tooth without prior caries removal or any tooth preparation. GI cement is used for cementation. We are basically sealing the dentine caries.

This technique is named after Dr. Norna Hall, a GDP (general dental practitioner) from Scotland who developed and used this technique for over 15 years until she retired in 2006.
The success rate was 67.6% after 5 years (retrospective study)

Radiographs were not routinely taken and crowns were usually only placed once marginal ridge breakdown due to caries had occurred.

Crowns were not placed on any teeth with clinical signs and symptoms of pulpal involvement

Contraindications:

-irreversible pulpal involvement

-insufficient sound tooth left to retain the crown

-patient cooperation where the clinician can’t be confident that the crown can be fitted without endangering the patient’s airways

-parent or child unhappy with esthetics

Hall crowns are a management option for an active, early to moderate proximal lesion involving the dentine in primary molars with no signs or symptoms of pulpal involvement

A visible band of normal appearing dentine between the carious lesion and the dental pulp on a bitewing radiograph is the key (radiographic sign used to indicate that there is no irreversible damage to the dental pulp)

The presence of this band of dentine is a good predictor of success when a hall crown is placed

Hall crowns are also indicated for moderately advanced occlusal lesions where the extend of the cavity would make it difficult to obtain a good seal with an adhesive restorative material

It’s important that the child knows that he will have to bite on the crown when you ask him to do so

An appropriate size of SSC should be selected and filled with GI cement before being seated over the carious primary molar using either finger pressure or the child’s own occlusal force.

As the SSC is fitted with no tooth reduction, the occlusion will be temporarily high. However, the occlusion normally equilibrates by the next appointment and none of the patients reported TMJ pain.

Before fitting the crown make sure there will be no danger of the child inhaling or swallowing a loose crown and is most easily done by sitting the child upright

Select a crown which covers all the cusps and approaches the contact point with a slight spring back

Fit the smallest size of crown which will seat

Do not try to fully seat the crown through the contact point before cementation, because a crown that is fully seated can be very difficult to remove

Crown should be at least 2/3 filled with GI luting cement

Fill the crown from the base upward, and ensure that there is cement around the walls

It’s not always easy, and requires a committed positive approach from the clinician

Most children do not find the procedure painful and prefer it over conventional filling

Two main methods of seating the crown:
1)finger pressure (by the clinician)
2)occlusal force (by the child)

Most of the time we use combination of these two methods

Partially seat the crown until it engages the contact point, allow your fingers to be removed without the risk of the crown falling off, the child is then asked to bite on it

Working time with GI cement is limited

Child should bite fairly on the crown for 2-3 minutes or the crown should be held down with fair finger pressure for 2-3 minutes

Often the crown will seat a little further expressing more cement; this is possible due to the displacing pressure by the adjacent teeth

If we have a tight contact and can’t put the crown; use a separator for a week