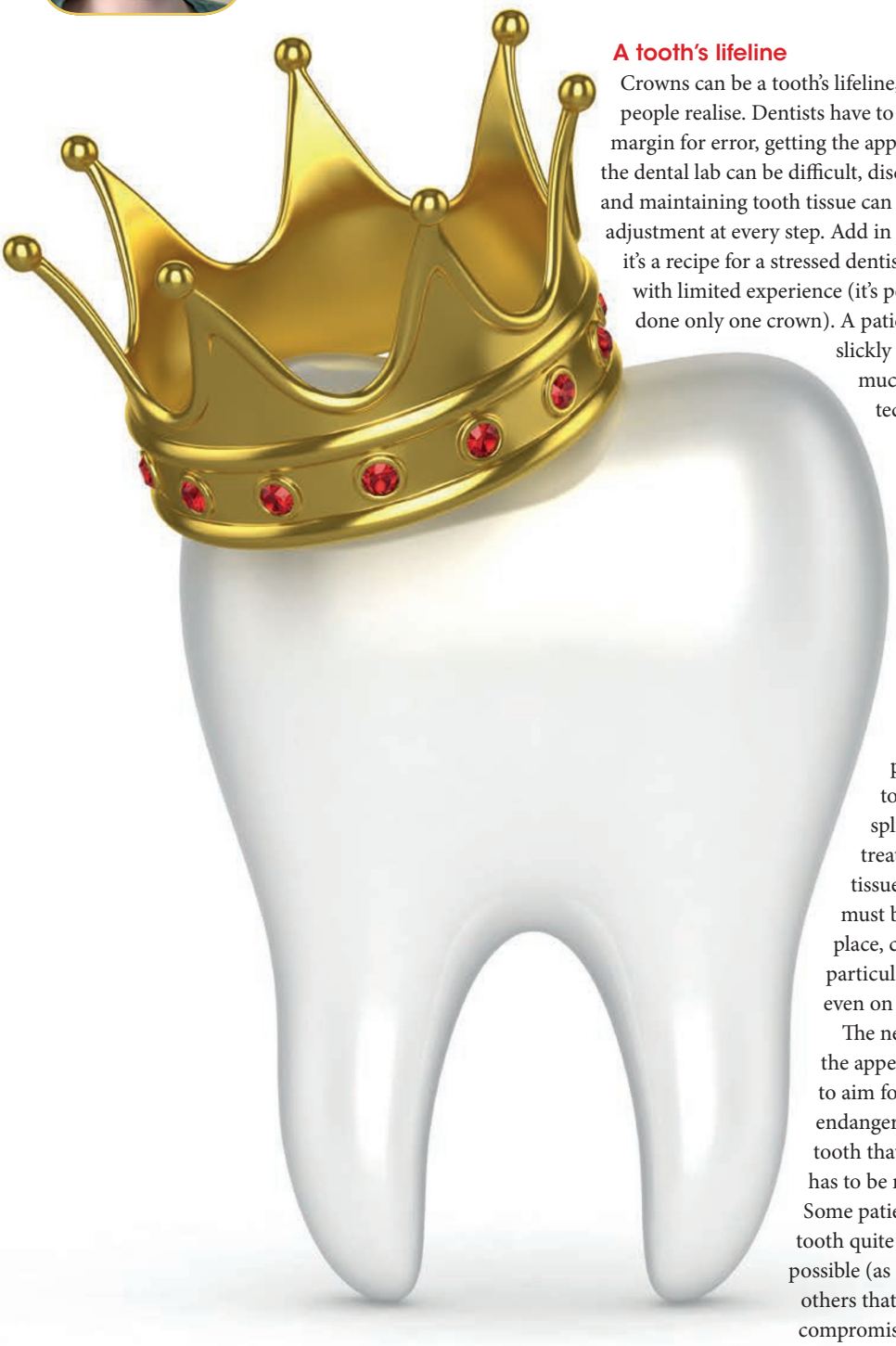
An introduction to crowns

CPD: ONE HOUR

In the first of a new series of articles focusing on specific areas of dentistry, freelance dental journalist **Jess Standley** takes a look at crowns.



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A tooth's lifeline

Crowns can be a tooth's lifeline, but are a far more complex procedure than most people realise. Dentists have to work in tenths of a millimetre, there's very little margin for error, getting the appearance right and communicating accurately with the dental lab can be difficult, discussions about the balance between appearance and maintaining tooth tissue can be tricky, and it can take a lot of painstaking adjustment at every step. Add in time pressure and any other added difficulties and it's a recipe for a stressed dentist, particularly if the dentist is recently graduated with limited experience (it's possible to graduate from dental school having done only one crown). A patient dental nurse who is supportive and can work slickly with the dentist makes the whole procedure so much easier. The roles of the dental nurse and lab technician are vital to the success of crowns.

Planning

The first stage is planning the treatment, and deciding whether or not to place a crown. A decision has to be made about whether a filling is sufficient, whether a crown is most appropriate, or whether the tooth has become unrestorable and an extraction has become necessary. Crowns can be quite destructive due to the amount of tooth tissue removed, but the advantage of them is that they can be protective to the tooth and can help to hold the tooth together (like a cap, preventing the tooth splitting outwards), particularly after a root canal treatment. No filling or crown material replaces tooth tissue like-for-like so unnecessary tooth destruction must be avoided, so although they certainly have their place, crowns should not be placed without good reason, particularly given their cost (which is upwards of £200, even on the NHS).

The next big question is whether the patient's priority is the appearance or saving tooth tissue. Sometimes choosing to aim for the optimum appearance can be done without endangering the pulp of the tooth (the nerve inside the tooth that keeps it alive), but at other times a compromise has to be made in order to keep the tooth alive and healthy. Some patients will be willing to accept a metal-coloured tooth quite happily to keep as much of their own tooth as possible (as metal crowns can be made much thinner), but for others that will not be an acceptable option. In most cases, compromises are agreed on, such as accepting a metal band

around the gingival margin of the tooth, or just having the outside/most visible part of the crown tooth-coloured and the rest metal-coloured. Discussing the priorities with the patient, and making sure they know what to expect at the end of treatment is a very important part of the process, to ensure they will be happy with the end result.

Another important part of the preparation is checking whether the tooth is alive and healthy. Often crowns are placed following root canal treatment, and it's important to check that any infection under the tooth is improving. If it is not root canal treated, then vitality tests and radiographs are normally done to check the health of the tooth.

Crown prep

The first stage of the crown preparation appointment (when the tooth is drilled to the right shape for the crown) is normally taking an impression for making a temporary crown while the permanent crown is being made. The impression can be done using alginate or putty. Alginate needs to be mixed smoothly and the impression needs to be accurate with no big air blows in the relevant area. Putty needs to be used if the impression may be needed at a later date, as alginate impressions soon lose their shape.

Then comes the actual 'crown prep' stage. Local anaesthetic is normally used to numb around the tooth being drilled. Trimming down the tooth for the crown is where the dentist's real skill is called upon. The amount of tooth tissue removed/space needed for the crown depends on the material used for each part of the crown. A greater thickness is needed for porcelain whereas metal can be thinner. In all cases, the difference between too little tooth tissue removed and too much is fairly tiny. The dentist will try to create a clear margin, ideally finishing on natural tooth rather than filling material, for the dental lab to work to. While a written lab form will communicate a lot of the information about the crown to be made, the work done on the actual tooth can give a lot of information about what the dentist is intending for the tooth and how they want the lab to make the crown. The margin needs to be clear in order for it to be picked up clearly in the impression so that the lab has something useful to work with and so that the end result is good.

Choosing shades

After the crown prep is completed, the shade(s) for the crown needs to be decided on, in the case of porcelain. A shade guide is used and the dentist will look at different shades compared with the surrounding teeth. If the crown is full porcelain, rather than part porcelain with metal underneath, the dentist may also record the colour of the tooth underneath that is being crowned; this can then be communicated to the lab, to give them a greater idea of what they are working with (as the underlying colour can shine through and affect the colour of the crown needed). Any little details wanted, eg stains or slight cracks on the tooth, can also be recorded and communicated.

Before the patient leaves, the tooth needs to be 'temporised'- this is where the tooth is covered in order to keep it safe and healthy while the crown is made by the lab, and it also helps to prevent movement or further eruption of the tooth that could prevent the crown fitting. The impression taken earlier in the process is used; temporary crown material is put into the impression and the impression is put back over the tooth. A small blob of the material is often put somewhere to give an indication of when the material is set. Once the material has gone hard, the impression and temporary crown is removed. The edges are smoothed off using polishing discs. Temporary cement is then used for sticking the temporary crown in place.

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The dental laboratory will then make the crown. This is also a very complex process, but largely falls outside what I will cover in this article. The dental technician will fill the impression with dental stone to create a model/die of the tooth to work on. The lab will work to the instruction of the dentist, creating what has been asked for. The process will vary depending on whether it is a full metal, a porcelain fused to metal or a full porcelain crown.

Once the crown returns back from the lab, the dentist will check that it is as they expected. They will check it goes on and off the model okay.

Crown placement

The temporary crown will be removed, the temporary cement will be cleaned off the underlying tooth and a cement will be decided upon. The crown will be tried in and out so that the dentist is certain about the placement of the crown. Cement will then be mixed and put into the crown, the tooth will be dried, and the crown will be placed. Excess cement will be cleared away using floss and dental instruments. Pressure will be maintained on the crown so that the cement sets with the crown fully seated/in the correct position.

The patient will then be asked how it feels to bite on. Often it will be slightly 'high', so the dentist will mark the teeth using articulating paper, so that the heavy contacts show up. Adjustments will then be made so that the crown is comfortable and doesn't interfere with the patient's bite.

Crowns can be a fabulous restoration, helping to save teeth that would otherwise have to be extracted. They can also be a very aesthetic option, particularly those made of/with porcelain. Crowns can be a very complex and involved procedure, but really demonstrate the important roles that different members of the dental team play in producing an end result that really meets the needs of/pleases the patient.

Summary of stages:

1. Deciding whether a crown is the most appropriate restoration
2. Planning the material(s) of the crown
3. Taking an impression to allow a temporary crown to be made
4. Shaping the tooth ready for the crown
5. Temporising the tooth
6. The crown is made by the lab
7. The temporary crown is replaced with the permanent crown
8. Any necessary adjustments are made.

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