Stiff alginate for denture impressions, why?

Every dentist or dental prosthodontist knows how difficult it is to make a well-fitting, stable denture. What they do not always realise, however, is the importance of the primary impression. An accurate, complete primary impression makes the following steps quite a bit simpler. This lecture explains how you can succeed in making your impression more complete and more accurate using stiff alginate, what the advantages are for the subsequent steps and how this contributes to the success of the full denture.

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The question now is whether stiff alginate can help us prevent such failures. And what is the advantage to the subsequent procedure?
Impressions using stiff alginate

And stiff alginate can help us... not only for full dentures, but also for partial dentures.

How and why will become clear during this presentation.
Subjects

- The impression procedure
- Primary impression edentulous maxilla
- Primary impression edentulous mandible
- The final impression
- Alginate impression with dentulous trays
- Impressions in partially edentulous situations

The lecture covers 6 subjects. We start with the impression procedure. This is closely related to the anatomy as an aid to the lining up of the impression, which is simplified by the use of stiff alginate. The impression procedure is explained for the edentulous upper and lower jaws. Furthermore the use of the stiff alginate technique combined with dentulous trays and in case of partial dentures is explained.
An edentulous patient …
The patient’s upper jaw is still nice and well rounded. The details are clearly visible.
.. And an atrophic lower jaw

Where to situate the flanges of the denture?

The mandible or lower jaw is a rather different story, because it is severely resorbed. It will be difficult to make a good impression. The major question in this situation is, “Where to situate the flanges of the denture?”
Anatomical illustration of the jaw

To answer this question it requires a considerable knowledge of anatomy. In other words, you need to be able to interpret a lot of the details on this drawing to be able to achieve a good impression in case of boner esorption. The use of stiff alginate can help here.
But what is bone resorption. Bone resorption is a gliding process. The edentulous patient generally starts off with a high, sturdy jaw and over the course of the years this disappears. It can resorb down to 15mm or even 10mm (a 'flat' jaw). There is also a kind of interim phase, a situation that does not always arise, where there is virtually no vertical decrease in the bone, but the jaw shrinks severely horizontally. This is known as a knife edge ridge.
Anatomical example: knife edge ridge

Here you can see an anatomical example. Vertically, the jaw has remained intact, but horizontally it has shrunk to a razor-sharp edge.
However it becomes increasingly difficult to make a well-fitting denture when the jaw shrinks as a whole, as well the upper as lower jaw. In the situation on the left, with minimal resorption and therefore little room between the two jaws, you can still get enough purchase for the denture. In the case of the severely resorbed jaws, as on the right, however, there is little place to find any purchase. You can imagine it’s essential to devote the maximum attention to the anatomy of the jaw.
Severely resorbed jaw
Severely resorbed lower jaw

If you examine this lower jaw clinically and try to interpret it, then at the back you will see a kind of negative arch. There are also irregularities. How are you going to interpret those? This also requires knowledge of anatomy.
Severely resorbed upper jaw

If you look at the upper jaw, you can imagine there is little bone underneath, that it is flabby. At the back of the mouth, too, all the structures have disappeared and the tubera are no longer visible. As we already have mentioned, it was fortunate that there was still an impacted canine in the jaw, which helped to gain stability for the denture. Here, too, knowledge of anatomy is indispensable.
Let’s start with step 1: the primary impression, comprising 3 parts: the well-fitting tray, the use of stiff alginate and the lining up of the impression.
Well fitting tray: anatomically formed

- anatomical structures are integrated in form of tray

For a good impression, you need a well-fitting tray. There are only a few trays that conform to those requirements because the anatomical structures for both the upper and lower jaw need to be integrated in the form of the tray. A nice example are the trays designed by Schreinemakers. Look at the anatomical details. At the back you can clearly see the trigonum, the tray is deeper on the inside at the location of the linea mylohyoidea and at the front a gap has been made for the brides. Such a tray will more easily provide a good impression.
You can choose from a number of trays in various sizes. This naturally raises the question of which tray size you should choose, as you will not achieve a good impression with this tray 'just like that'.
Selection of tray size …

…is based on the width of the jaw and not the height!!!
...the same tray!

Or to put it another way, the size of the chosen tray is always the same regardless of the degree of resorption. In other words, whether there is no resorption or a lot of resorption, you always choose the same size tray.
Tray size

This means that, in this situation, this, this and - in the most extreme case - this situation, the same tray is used. In the first situation, the tray is close to the arch. And in the case of the last situation the tray hangs above the mandible. If you would depress the tray, then you would erase any recognisable anatomical structure and therefore end up with a useless impression. The anatomically-formed tray should therefore be used extremely consciously and you should realise that, with a severely resorbed jaw, the tray hangs above the arch.
Severely resorbed jaw

- A lot or room between arch and tray
- A great deal of impression material required
- Stiff alginate recommended

So in case of a severely resorbed jaw, there is a lot of room between the arch and the tray. And as the tray is hanging above, you need a great deal of impression material to bridge the gap. In this case, stiff alginate is a must.
Tray size

As mentioned earlier, the tray is chosen based on the width of the jaw. It is important to ensure that the tray has enough room for the alginate, roughly the thickness of the compass arm. If there is less room, then there will be too little alginate, so the material will quickly distort. A wider tray is also far from ideal, as the anatomical details would then disappear.
For the upper denture, you measure the distance between the widest part of the jaw in the mucobuccal fold at the position of the tubera maxillares. Ensure that the tray is big enough. If in doubt, use one size larger.

For the lower denture, you need to ensure that the dorsal tray rim covers the retro-molar path entirely. Measure the inside of the lower jaw with the outer edge of the compasses at the position of the retromolar path. Ensure that the tray is lingual not too far from the jaw; if in any doubt use one size smaller.
Tray size

If you have an old denture, then you don’t need the compasses. You then choose for the upper denture a tray that is slightly bigger than the jaw and for the lower denture a tray that is slightly smaller than the jaw.
Fitting in mouth

Check the measurement of the tray in the mouth.
If the jaw is severely shrunken, then stiff alginate is essential. You can achieve this by adjusting the amount of water. When you add less water, the alginate becomes stiffer. With a severely shrunken jaw you are recommended to use $1/3$ less water. With a less shrunken jaw, you can adhere to a more normal ratio. The more shrunken the jaw, the stiffer the alginate. As an auxiliary aid, the Cavex measuring beaker has an extra high viscosity water level, which corresponds with approximately $1/3$ less water.
Stiff alginate

How to proceed? Measure 3 level scoops of alginate powder. Use alginate with a good water absorption, which mixes easily with as few lumps as possible, such as Cavex Impressional. Add 30% less water (the high viscosity line on the Cavex water beaker). Mix this in a supple beaker with a metal spatula. It takes quite a bit of effort to mix the stiff alginate and, initially, it looks as if there is no more water, only granules. It might look as if it is not mixing properly, but that is not the case. This is one of the moments when the quality of the alginate becomes clearly visible. An alginate with a good water absorption and minimal lumpiness ultimately gives a well-mixed mass. If you wish to simplify the mixing, then the Cavex alginate mixer is recommended. The result is at least the same, but the mixing is quite a lot easier.
Primary impression maxilla

What you need to watch out for if you want to make an impression of all the anatomical details of the upper jaw: make sure the patient is relaxed and the tray is centred in the mouth. There are 2 techniques for centering the tray. You can centre the tray in the front and then rotate backwards. The risk here is that the border turn out too short by the tubera. This can be avoided by lubricating the tubera beforehand. Alternatively, you can chose to centre the tray dorsally and then rotate it forwards. In the case, it is important to lubricate the front. Thanks to the stiff alginate, the lips and cheeks are extended. Then impress the anatomical structures with your fingers. You can make an impression of the frenula by making some room in the front and pressing gently.
Importance of a complete primary impression
Lining up primary impression maxilla

Where to situate the borders of the denture?

Here you see a primary impression with a well-fitting tray and stiff alginate. The question now is whether we have made a good impression. We therefore have to check whether all the anatomical structures which are relevant for the borders of the denture, have been reproduced in the alginate impression. This is why we advise the lining up of the primary impression, too.
Lining up primary impression maxilla

- Buccale frenae
- Buccale sulcus
- Foveae palatinae
- Labial frenae
- Hamulus pterygoideus
Lining up primary impression maxilla

This is the result of the alignment; the impression can now be cast and the custom tray can be made.
Subjects

• The impression procedure
• Primary impression edentulous maxilla
• Primary impression edentulous mandible
• The final impression
• Alginate impression with dentulous trays
• Impression in partially edentate situations
As we said, for the lower jaw we choose a tray that is slightly smaller than the arch or in case of an old denture a little smaller than the old denture.
Fitting tray on the mandible

That is quite a subtle art. Take this patient with a protruding mouth floor, for example. Here, you really need to make sure there is the minimum space between the arch and the tray and not the maximum space, as, if the tray is too large, you risk the mouth floor coming above the arch or between the tray and the tongue, and that is not the intention.
Here, you see a more extreme example of a patient with a protruding mouth floor. If you move the tongue to the left or right, then you will see that the mouth floor is conspicuous. It is absolutely essential to make sure this distance is no more than the thickness of the compass arm. The minimum space, in other words.
Stiff alginate for the mandible

We have already seen how to make stiff alginate. In the case of a severely resorbed mandible it can be that stiff, that you can make a roll of it. Place the roll in the tray and moisten it slightly.
Primary impression mandible

Centre the tray in the mouth. Ask the patient to stick out his tongue. This eliminates the mouth floor. It is only then that you push down the tray. If you continue to push down and the tongue is above then you are forcing the mouth floor to come further in between the tray and the arch. You then depress the frenae slightly from the outside so the anatomical structure becomes visible.
And this is the result. The question now is whether the impression has been successful. We can check this by lining up the impression based on the anatomy in the mouth.
Lining up primary impression mandible

But which anatomical structures are important for the customised tray and therefore for the lining up of the edentulous mandible? By the trigonum (retromolar pad), you need to make room for the masseter muscle, in other words the tray has to taper slightly by the trigonum. The Masseter muscle will become visible in the impression, as it is tensed during impression. We then come to the Buccinator muscle, where the pouch is. There, you can expand outwards as far as possible, close up against the Buccinator muscle. The tray border then tapers somewhat by the buccal frenae because, if you want the denture to stay in place while talking, etc., then it must not be too long. In the front we have a similar problem, as the Mental muscle is not tensed so highly, which means the denture can be a little longer there. Often, there is a labial frenae present, but not always. When it is present, you need to make space for it. On the inside is the spina mentalis posterior. In a severely shrunken arch this structure is very prominent, but that is not always the case. If it is there, then the denture can be situated against the edge of the spina line. The genioglossus muscle runs from the spina to the tongue. Finally, there is the mylohyoid line and the mylohyoid muscle, which determine the border at the back. As the mylohyoid muscle runs quite vertically at the back, it does not displace the denture and the denture border can be made behind the mylohyoid line at the back. It is therefore important for the primary impression to continue to just behind. In other words, you end up with a customised tray and therefore also a denture with a fairly long lingodorsal ridge, which nevertheless does not cause any displacement of the denture.

- M. Masseter
- M. buccinator
- Linea mylohyoideus
- M. genioglossus
- M. mylohyoideus
- Spina Mentalis Posterior
- M. Mentalis
- Frenulum buccale
- Frenulum labiale
lining up primary impression mandible

- Masseter muscle
- Mylohoid line
- Mylohyoid muscle
- Buccinator muscle
- Spina Mentalis Posterior
- Genioglossus muscle
- Buccal frenae
- Mental muscle
- Labial frenae
Let's just check the impression. The mouth floor has been depressed and all the anatomical details have been reproduced. The trigonum is reproduced in its entirety, including the masseter muscle and mylohyoid line, the labial tendon is visible and the mouth floor has been depressed. Everything is visible on the other side, too. So the impression is successful and can be lined up.
Lining up primary impression mandible

In this impression, too, the anatomical structures are clearly visible: the masseter, the pouch, here the impression was overextended and, on visual inspection in the mouth, you could see that it could not be extended any further, but that everything had been reproduced. In one place the alignment goes in and in another it goes out again.
With a protruding mouth floor, you might think you ought to make the lingual rims of the denture shorter. So why devote so much attention to the impression process? These 2 examples illustrate why. This was the loose old denture and this is the new one. The rims here have been made longer lingually, up passing mylohyoid line, by depressing the mouth floor. Practice has shown that this length is possible.
Primary cast

After lining up the primary impression a primary model will be made, which will be lined up according to the anatomy as reproduced and aligned on the primary impression.
Custom tray

Here you can see the lining up of the primary cast. The customised tray has to fit it exactly, the tray follows the lining up precisely.
Custom tray

Always use acrylic denture base materials, as it is important for the customised tray to be pressed well onto the jaw. A wax rim is then applied.
The impression procedure

**Final model/definitive cast**
- visible borders

**Final impression**
- checking borders
- moulding borders
- detailed impression

**Primary impression**
- fitting tray
- stiff alginate
- lining up impression

**Primary cast**
- complete record
- peripheral lining

**Customised tray**
- border requirements
- wax rim requirements

And this brings us to the difficult step, step 4, making the final impression. During the first 3 steps a lot of time was spent on the anatomy, as a basis for determining the borders of the customised tray and the denture. It is therefore extremely important to try the borders of the customised tray in the mouth at the beginning of step 4.
In other words, an impression and a model have been made based on the anatomy. The model has been lined up and a customised tray has been made following the peripheral lining. To be sure that the impression procedure has been followed accurately and that the information is correct, the tray need to be tried in the mouth.

What do you need to watch out for when trying the custom tray? First of all the length. This is checked by asking the patient to stick out his tongue and touch the upper lip with it, to see whether the tray stays in place, in other words that it fits properly lingually. If the tray moves, then the tray is too long. You can check whether the tray is too short by looking in the mouth.
Functional moulding

• Previously “border trimming“
  – Borders are 2 mm shorter
  – Stiffer stents (impression compound)

• Nowadays “finishing off” the borders
  – Borders are <1 mm shorter
  – Supple (viscous) stents

Once the borders are checked in the mouth, the border can be trimmed or rather, be finished off. According to the classic technique, where no attention was paid to the alginate impression and the lining up, you often had a border which was 2 mm too short in comparison to the final denture, then the border need to be trimmed with stiff stents. With the stiff alginate technique, a great deal of attention is devoted to the alginate impression and the lining up of that impression and the primary model, which results in a customised tray with anatomical structures and a border more or less equal to that of the final denture. This is why we no longer talk about trimming the border, but about finishing it off, which is done with supple impression compound with a lower melting point.
Finishing off borders

Also the finishing off is carried out step by step, so all the details are properly reproduced. And you’ll see it the customised tray fits properly, the finished off borders are hardly any longer, because the borders only get longer where the customised tray is too short, which is not the case.
Finishing off the border

If the tray fits properly, then you naturally need to ensure that the tray continues to fit, so the superfluous material that gets in between during finishing has to be removed.
The impression procedure

**Final model**
- visible borders

**Final impression**
- checking borders
- moulding borders
- detailed impression

**Primary impression**
- fitting tray
- stiff alginate
- lining up impression

**Primary cast**
- complete record
- peripheral lining

**Custom tray**
- border requirements
- wax rim requirements

The tray has now been checked and finished off. This brings us to the last stage of “the final impression”, the detailed impression.
The final impression

Here you see the tray, with the finished border. The anatomical structure is clearly visible and the borders are clearly reproduced. Only the anatomical structure of the middle part is not clear yet. Therefore a detailed impression with light viscosity material need to be made. Ensure that all movements are made. You see the result, the borders have not become any longer and in the middle part the anatomical details are properly reproduced. Finally, don’t forget the adhesive, as you can easily pull fine material apart.
The impression procedure

Final model
- visible borders

Final impression
- checking borders
- moulding borders
- detailed impression

Primary impression
- fitting tray
- stiff alginate
- lining up impression

Primary model
- complete record
- peripheral lining

Custom tray
- border requirements
- wax rim requirements
Here you see a patient’s primary and final model. The great difference between the two models is the raised plaster border. The entire impression procedure can be derived from that border.
It is therefore essential to cast the model carefully, preserving width and depth of the sulci, so the border remains clearly visible. If this border is filed away, then you’ll miss all the detailed information, which is a waste of the energy that has been spent on the anatomy.
Subjects

- The impression procedure
- Primary impression edentulous maxilla
- Primary impression edentulous mandible
- The final impression
- Alginate impression with dentulous trays
- Impression in partially edentulous situations

during this impression procedure we’ve used an edentulous tray, but it happens an edentulous tray is not appropriate and one need a dentulous tray in case of an edentulous jaw.
Using dentulous trays with edentulous patients

Because dentulous trays for the edentulous mouth, it really is possible. But not all dentulous trays are suitable. Particularly important is that the tray runs dorsally up to and including the trigonum and the tuberosities, so the primary impression can reproduce the information in full.
Dentulous trays: when?

Why use a dentulous tray? Here is an example for which it is difficult to find a suitable edentulous tray. This is because the jaw is only slightly shrunken, as there are still roots in the upper arch. The edentulous trays are often too short. In such a situation, the use of a dentulous tray can be appealing. First try amongst the edentulous trays and if you don’t succeed then the dentulous trays are a good alternative. Another case in which
Dentulous trays: when?

With this patient, a primary impression is being made with stiff alginate and a dentulous tray.
Impression with dentulous tray
Which dentulous trays?

As we mentioned earlier, not all trays are suitable for this technique. Most trays do not include the tuberosities, so if you use them to make an impression of an edentulous jaw you miss essential information and it will not work properly. Schreinemaker’s dentulous trays (in plastic or metal) do include the tuberosities, so they can be used for making impressions of edentulous jaws.
Impression with dentulous tray

Adhesion by means of
- perforations under rimlock
- using stiff alginate
- moistening alginate
- using excess alginate
- using adhesive

Drill holes!!
Subjects

• The impression procedure
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• Primary impression edentulous mandible
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• Impression in partially edentulous situations
Impression for removable partial dentures

This will be illustrated with the case based on which we explained the impression procedure with a dentulous tray for the edentate maxilla. Here you see the partial mandible, which requires a frame prosthesis. In this case, however, it is important to make sure all the anatomical details are reproduced. The question is, “Will that work with a dentulous tray and will it work with alginate?”
Impressions for removable partial dentures

Should include:

• the teeth
• the occlusal rest seats
• the denture bearing tissues
• the lingual area

What is the problem?

When making an impression for a partial denture a number of factors play a major role: the teeth must be clear, the occlusal rest seats must be clearly recognisable, the denture bearing tissues must be clearly visible and finally, the lingual space has to be correct. So how do you make a good impression of this?
Purpose of the impression procedure
What are the options?

**Precision impression with custom tray**
- Accurate

**Altered cast method**
- Time consuming

**Dentulous fabrication tray with stiff alginate**
- Simple

There are 3 methods for this. The first is the precision impression with the custom tray. This is actually the most accurate method. Then there is the altered cast method. This is also very accurate, but quite laborious, not only for the dentist but also for the dental technician. Finally, there is the technique using a dentulous off-the-shelf tray with stiff alginate. This, too, clearly reproduces the anatomical structures and is relatively simple. This technique will be explained based on our case.
Impression options

We still have a lower front excluding canine. We want to make an impression and see all the details. How can we realise this?
Here, you use the anatomical trays and stiff alginate. A tray is chosen based on the model and that appears to succeed quite well.
Stiff alginate method

The alginate impression can be made. The tray is placed above the jaw in the mouth, then it is depressed. We ask the patient to stick out his tongue so that the brides are included.
Stiff alginate method

Resulting in this impression. And are all the anatomical details included?
Stiff alginate method

Look: the brides are clearly visible, even the tongue tendon, thanks to the room made in the tray.
Stiff alginate method

Also at the back, everything is included, up to behind the linea mylohyoidea, including the trigonum and overextended flanges. Thanks to the stiff alginate you get a perfect imprint of the bearing area under pressure.
Stiff alginate method

In other words, looking at the impression and the plaster model you will see that all the anatomical details important for the partial denture have been sufficiently reproduced. Alginate is sufficiently detailed, so the elements and occlusal rests seats are clearly visible. And the mucosal parts are imprinted completely and under pressure.
You then assemble the prosthesis and fill up the rims. They should be longer than shown here.
Stiff alginate method

Adhesion through
- perforations under rimlock
- using stiff alginate
- using a lot of alginate
- using adhesive

Tips:
- block out interdigitations
- break impression trays
Impressions with stiff alginate

Summarizing, there has been spoken about impressions using stiff alginate in the case of an edentate jaw and a partially edentate jaw. Resulting in a complete denture or removable partial denture. Related to this a number of subjects have been discussed.
The impression procedure

Summary

Final model/def.cast
- visible borders

Primary impression
- fitting tray
- stiff alginate
- lining up impression

Final impression
- checking borders
- moulding borders
- detailed impression

Primary model
- complete details
- peripheral lining

Customised tray
- border requirements
- wax rim requirements
Advantages of stiff alginate for impressions of edentate jaw

• All anatomical structures are visible in the ‘over-contoured’ impression and therefore easily interpretable

• Prevents the impression tray being pushed into the muco-buccal fold with severely resorbed jaws

• Prevents interposition of a protruding mouth floor
Impression with dentulous tray

Adhesion by means of
- perforations under rimlock
- using stiff alginate
- moistening alginate
- using excess alginate
- using adhesive

Drill holes!!
Impression options in case of partial edentulous jaws

- Dentulous fabrication tray with stiff alginate
Advantages of stiff alginate for impressions of partially edentate jaw

• The VP advantages +
• Pressure on the mucosa to compensate for the discrepancy in impressibility of ‘mucosa elements’ – with Kennedy I and II
• The procedure is simple and effective
Shopping list

- An anatomical shaped tray (including trigonum, linea mylohoidea and a gap for the frenae) eg. Schreinemakers trays
- High quality alginate with a good water-absorption, easy mixing without lumps, high tear-resistance and elasticity eg. Cavex Impressional
- A souple impression compound with a lower melting point
- Light viscosity wash material : eg. Xantopren blue, Provil novo light CD,…
- A universal adhesive