

## FOCUS ON: THE MANDIBULAR SYMPHYSIS

Every mammal has two mandibles: one on the right and one on the left. In pigs and primates, the mandibles fuse at the midline during puberty. In all other domestic mammals, the mandibles remain as two distinct and separate bones that are associated with each other at the symphysis.

### Anatomy of the Symphysis

The symphysis is a synarthrosis, which is defined as “a form of articulation in which the bony elements are united by continuous intervening fibrous tissue”. Actually, symphysis is defined as “a site or line of union...in which apposed bony surfaces are firmly united by a plate of fibrocartilage”. So between the rostral ends of the two mandibles, there is a plate of fibrocartilagenous tissue. This tissue is radiolucent, so radiographs of the rostral mandible in dogs and cats will always show a lucent line running down the mid line.



Radiograph of the rostral mandibles of a cat showing the distinct lucent zone occupied by the fibrocartilagenous plate.

In some animals, the fibrocartilagenous plate is thin and firm and the bone on either side folded so that one side interdigitates with the

other side. Typically in large, young, healthy dogs, the symphysis is a narrow, firm union with virtually no mobility between the two mandibles. In smaller dogs, especially the little brachycephalic breeds, the symphysis is normally quite wide and will have varying degrees of mobility.

Over time (years), the fibrocartilagenous plate may stretch and become flaccid. Once there is a bit of mobility, continued chewing activities tend to stretch the symphysis further, thus increasing mobility in a self-perpetuating cycle.

When chewing hard food, treats or toys, both mandibles are pulled closed by the same amount of muscle tension, but one mandible meets the resistance provided by the food/treat/toy. The other mandible has its movement restricted at the symphysis. Thus chewing activities place a strain on the symphysis so that if it started life loose, it will stretch further and become looser over time.



This symphysis in a 6-month-old Labrador is so narrow it is barely visible.

### Fractured Symphysis– NOT

It is common for people to refer to a “fractured symphysis”. This is a misnomer. Bones can fracture. A tooth can fracture. A fibrocartilagenous plate cannot fracture. It

can rupture or be avulsed from its attachment to the bone. However, most cases of so-called symphyseal fracture are nothing more than a gradual and chronic laxity of the synarthrosis. It is often detected incidentally during a dental procedure and the typical response to this finding is to assume that the operator has caused the “fracture” during surgical manipulations (extraction of canine or incisor teeth).

Now look at the anatomy in the radiograph below. While the incisor roots are long compared to the crowns, they are short relative to the length of the symphysis. The canine roots are well off to the side of the symphysis, with some substantial bone in between. Extraction of mandibular canines and incisors is very unlikely to cause damage to a healthy (or even a loose) symphysis.

What can happen during mandibular canine tooth extraction is a fracture of the mandible through the alveolus. This bony fracture will require some form of treatment, the specifics of which depend on the size and species of patient and the severity of the fracture. However, this has nothing to do with the symphysis.



This symphysis in a mature shihapoo is very wide and likely always has been. There may or may not be some mobility at such a symphysis.

## Loose Symphysis

Now, suppose you have a patient in which you have identified a loose symphysis. Your intra-oral dental radiograph (which is a must as part of the assessment and treatment planning) show no bony fractures or evidence of osteolytic tumor or infection. So, what do you do about it. In the vast majority of cases **DO NOTHING**. The last thing you should do is wrap wire around the base of the canine teeth or circumferentially around the mandibles just behind the canine teeth. Such a procedure will do no good and will cause pain and tissue damage at least.

Remember, in a loose symphysis, there is no trauma to heal. There is just a flabby fibrocartilagenous plate. Since there is nothing to heal, stabilizing with wire (or by any other means) will not cause the flabby plate to tighten up. Suppose, I taped your two middle fingers together for a month. At the end of the month, when we take the tape off, you still have two separate fingers – they did not heal together and become one big finger, because there was no trauma to heal. Wire the symphysis for a month and when you take the wire off, the symphysis will be just as loose as before – a waste of time, money and effort.

While the wiring of a loose symphysis does no good, it can do harm. Whether the wire is wrapped around the base of the canines or around the mandibles, when it is tightened, it will usually pull the mandibles too close together and alter their alignment. This can cause the mandibular canine teeth to malocclude with the maxilla and put strain on the temporomandibular joints. That's no good. Then the physical presence of the wire in the mouth or running through the soft tissues behind the canines causes tissue trauma and can lead to infection of the tissues. All of this is painful without benefit.

If a loose symphysis is loose enough to actually be a clinical problem for the patient (I have never seen such a case), the only way to tighten it would be through arthrodesis. The soft tissue on the floor of the mouth would be reflected to expose the symphyseal

fibrocartilage. The fibrocartilage between the ends of the mandibles would be scraped out. The space between the mandibles would be filled with a bone graft (autogenous or synthetic) and the soft tissue floor of the mouth sutured back in place. Then the mandibles would have to be held rigidly in proper anatomical alignment for 4 to 6 weeks with an acrylic intra-oral splint. Care needs to be taken to maintain proper angulation of the mandibles and spacing between the mandibular canines to avoid causing an iatrogenic malocclusion or TMJ problems.

I have described this surgical procedure to dozens of people over the years, but so far, upon reflection, not one clinician has felt that the looseness of the symphysis has been enough of an issue to refer the patient for this surgery.

### Actual Ruptured Symphysis

With craniofacial trauma, ruptures of the symphyseal plate are not uncommon. Almost every mandibular body fracture will be associated with a ruptured symphysis as are many TMJ dislocations. Now we have a situation where the laxity at the symphysis is associated with acute trauma. There is damage that needs to heal. Now we do need to stabilize the symphysis. However, it is still no good to wrap wire around the base of the canines or around the mandibles behind the canines.

I already mentioned some of the problems caused by wiring a loose symphysis. Another problem is that it will not give the necessary stability. When wire is wound off the spool and threaded through tissues, it inevitably develops bends and kinks. As the wire is tightened, most of the kinks straighten out a bit, but they always remain. In the days following surgery, these kinks straighten further creating slack in the wire and instability at the rupture site. Also, wire stretches and cuts through tissue, creating further slack. Within a week the wire is usually palpably loose. Now it is just a painful nuisance.



This ruptured feline symphysis seems to have enough wire to create stability, yet within days, there was mobility and the mandibles slid out of alignment.

So, how does one stabilize a ruptured symphysis? My preferred method is with an intra-oral acrylic splint attached to the mandibular canine teeth. Wire or suture material can be wrapped around the base of the canines to draw them into proper anatomic alignment and hold them there while the splint is applied. Application of the splint is accomplished with a variety of materials depending on the size of the patient and its expected behaviour following discharge. Bonding agents, reinforcing woven ribbon, composite resin, acrylic materials and glass ionomers may all be employed.

Whatever is used, the objective is to hold the mandibles rigidly in proper anatomic alignment for 4 to 6 weeks while allowing the patient to eat and drink comfortably. Typically, the same splinting materials are also used to stabilize the mandibular body fracture.

Post-op instructions include ensuring that only air, water and very soft food enter the patient's mouth until the splint is removed. Daily flushing and rinsing around the appliance with an antiseptic is also indicated if it can be accomplished without too much of a struggle (we do not want the owner breaking or dislodging the splint in a wrestling match).

## Conclusion

- A chronically loose symphysis rarely (if ever) needs any treatment.
- An acutely ruptured symphysis needs stabilization with maintenance of proper anatomic alignment the highest priority.
- “Wiring” a symphysis will typically do more harm than good.
- An intra-oral acrylic or composite splint anchored to the mandibular canine teeth will give excellent, rigid stabilization, is comfortable (if properly designed) and allows rapid return to eating and drinking.
- A “loose symphysis” that develops during dental treatment or oral manipulation is much more likely to be an iatrogenic mandibular fracture. Investigate the possibility of osteolytic tumor or infection predisposing to this fracture.