# Mandibular Erosion from Silastic Implants: Evaluation with a Dental CT Software Program

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**Summary: Silastic implants used to augment the chin during cosmetic surgery may cause erosive bone changes and complications. We describe the radiologic appearance of these changes and the dental CT reformatting programs by which they may be assessed. Multiplanar CT scans of four patients with Silastic chin implants were evaluated retrospectively for implant density, presence and size of bone defects, relationship of defects to root apices, relationship of defects to mental foramen, and associated findings. The dental CT software program was instrumental in delineating the relationship between the bone defects and the root apices.**

Silastic implants have a soft pliable consistency that allows them to be readily modeled to the body contour for augmentation of soft-tissue deficits during cosmetic surgery. In the face they have been used for augmentation mentoplasties to correct the "weak" chin-mandible complex (1). This is described as a disproportionately small chin relative to the remaining mandible, which tends to diminish highlighting of the mentum of an otherwise well-proportioned face.

An alternative to the use of implants requires a more involved surgical procedure that entails a horizontal mandibular osteotomy to advance the chin. Since the implant surgery is relatively simple, it has became quite commonplace. According to the American Academy of Cosmetic Surgery, many of the estimated 35 000 chin procedures performed yearly involve the use of implants. Unfortunately, Silastic implants are not without potential risks and complications. Resorption of bone was described by Robinson and Shuken in 1969 (2). Since then, it has been further characterized and documented in animal studies (3, 4). This resorption occurs in the midline on the buccal surface of the mandible and may potentially jeopardize the adjacent teeth by exposing or eroding the root apex, which contains the neurovascular bundle.

Patients who had their implants placed many years ago may now be seeking medical attention for pain, tightness, paresthesia, implant migration, and so forth. The use of plain film radiography to examine these patients has been inadequate because it fails to delineate the relationship between bone erosion and the root apex and other anatomy. We therefore used a dental computed tomography (CT) software program that displays multiplanar CT scans of the jaw to establish the radiologic appearance of Silastic implants and their complications.

## Methods

The CT scans of four patients with Silastic chin implants were evaluated retrospectively. Two patients were referred because of symptoms related to the Silastic implants (case 4, Fig 1); one patient was referred because of a mass in the mandible (case 1, Fig 2); and the last was referred for evaluation of dental implants (not to be confused with Silastic implants) (case 2, Fig 3). The studies were acquired on a Highlite Advantage CT scanner (General Electric, Milwaukee, Wis) using 1-mm axial sections. DentaScan software (General Electric) was then used to reformat multiple panoramic and cross-sectional scans of the mandible. The scans were evaluated for implant density, presence and size of bone defect, relation of defect to root apices, relation of defect to mental foramen, and associated findings. The clinical histories and surgical results, when available, were compared with the radiologic findings.

## Results

All four patients had concave erosion of the buccal surface of the mandible adjacent to the implant (Figs 1–3). The defects ranged from 1.5 mm to 4 mm in depth, and a sclerotic cortical margin was maintained within them (Fig 1). The dimensions of the defects and their relationships to the root apices are summarized in the Table. In two of the patients, the erosive defect extended to involve the root apex (Figs 1 and 3). In one of these patients, it eroded into a periapical radiolucency created by a periapical abscess (Fig 3). The cortical margin was disrupted at the point where the implant and periapical abscess met.

New bone formation was noted in three patients. In two, it extended from the margins of the defect and appeared to surround portions of the implant (Figs 2B and 3B). In the third, it grew through holes punched in the implant (Fig 1B). This was confirmed at surgery.

The density of the implants was intermediate between muscle and bone, and the mental foramina were lateral to the implants and uninvolved. One patient had an associated giant cell reparative granuloma, which was adjacent to and involved with the implant and defect (Fig 2).

One patient (case 1, Fig 2) presented with an expansile mass in the right central portion of the mandible that proved to be a giant cell reparative granuloma at surgery. The patient reported that before seeking medical attention for the mass, he felt like there was "something there," and that the implant was intermittently painful and seemed to have moved from its original position. At surgery, the tumor had grown into the bone defect and was engulfing part of the implant. The segment of implant uninvolved with tumor had heterotopic bone growing around itself, similar to the way in which a tree may grow around and engulf a hook used to hold a hammock.

The second patient (case 2, Fig 3) was referred for a DentaScan prior to surgery for a dental implant (not to be confused with the Silastic implant). The referring dentist was unaware of the Silastic implant until it and a periapical abscess

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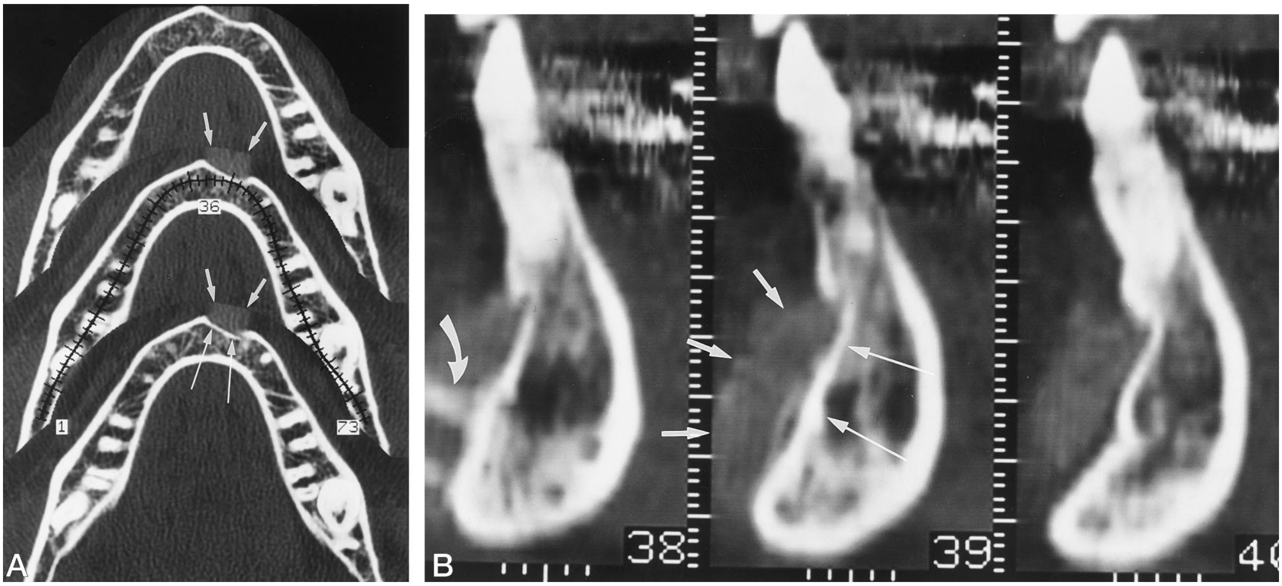


FIG 1. Axial (*A*) and cross-sectional (*B*) DentaScan images illustrate a Silastic implant (*short arrows*) creating a concave erosive defect in the buccal surface of the mandible. The defect has eroded to the level of the root apices of the left central and lateral incisors. Note that a sclerotic cortical margin is maintained within the defect (*long arrows*). In *B*, a bone peg is seen growing through a hole in the implant (*curved arrow*).

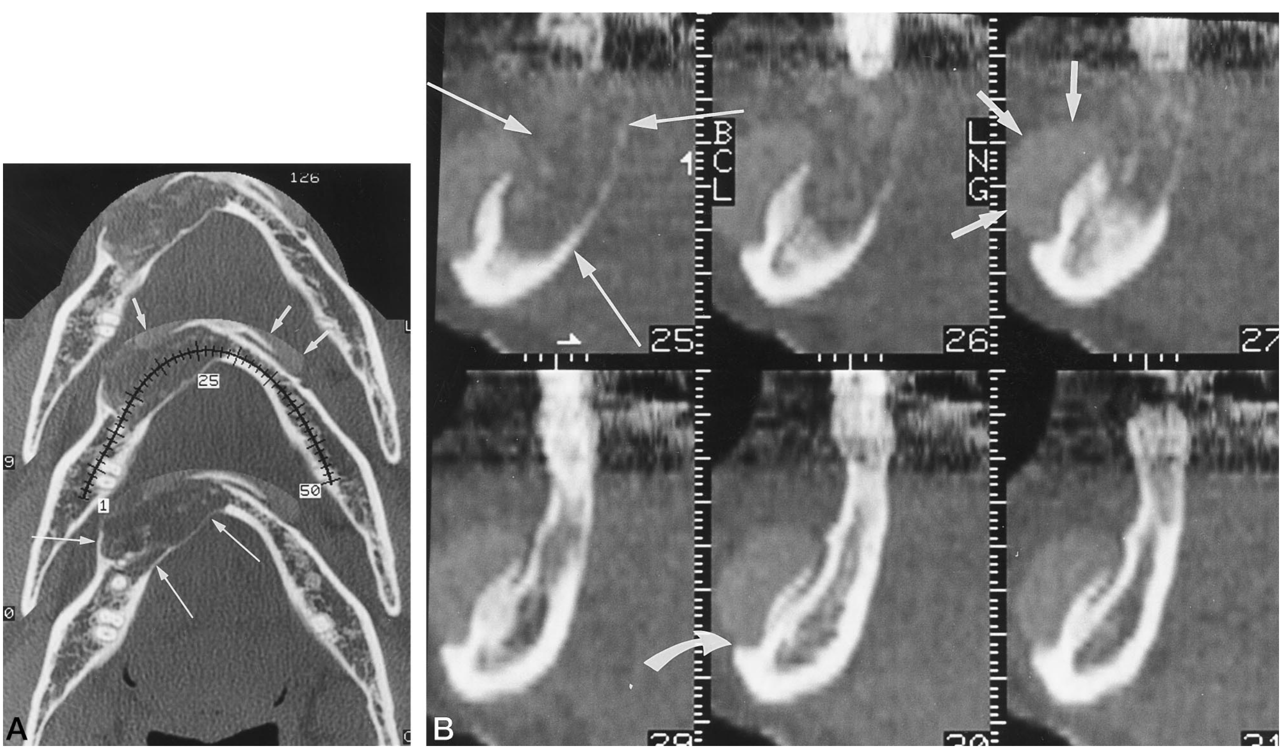


FIG 2. Axial (*A*) and cross-sectional (*B*) DentaScan images of the mandible show a Silastic implant (*short arrows*) causing an erosive defect adjacent to and contiguous with a giant cell reparative granuloma (*long arrows*). The tumor expands the mandible and thins the cortex. In *B*, note heterotopic bone growing around the implant (*curved arrow*).

were seen on the CT scan. The patient had a mandibular molar extracted and a single dental implant placed at that location. The periapical abscess of the left central incisor was treated with a root canal procedure. No treatment related to the Silastic implant was given at that time, and the patient was lost to follow-up.

The third patient (case 3) had a DentaScan to evaluate a Silastic implant prior to its removal because of poor cosmetic results. No further information was available.

The fourth patient (case 4, Fig 1) had an implant placed 25 years earlier and reported intermittent pain in the chin, which was greatest on the left and slightly worse in the 2 months preceding presentation. The DentaScan showed a defect that eroded the bone adjacent to the root apices of the left central and lateral incisors. The implant was removed because of the pain and its proximity to the teeth. At surgery, pegs of viable bone were noted growing through each of three holes in the implant. The patient's symptoms resolved after surgery.

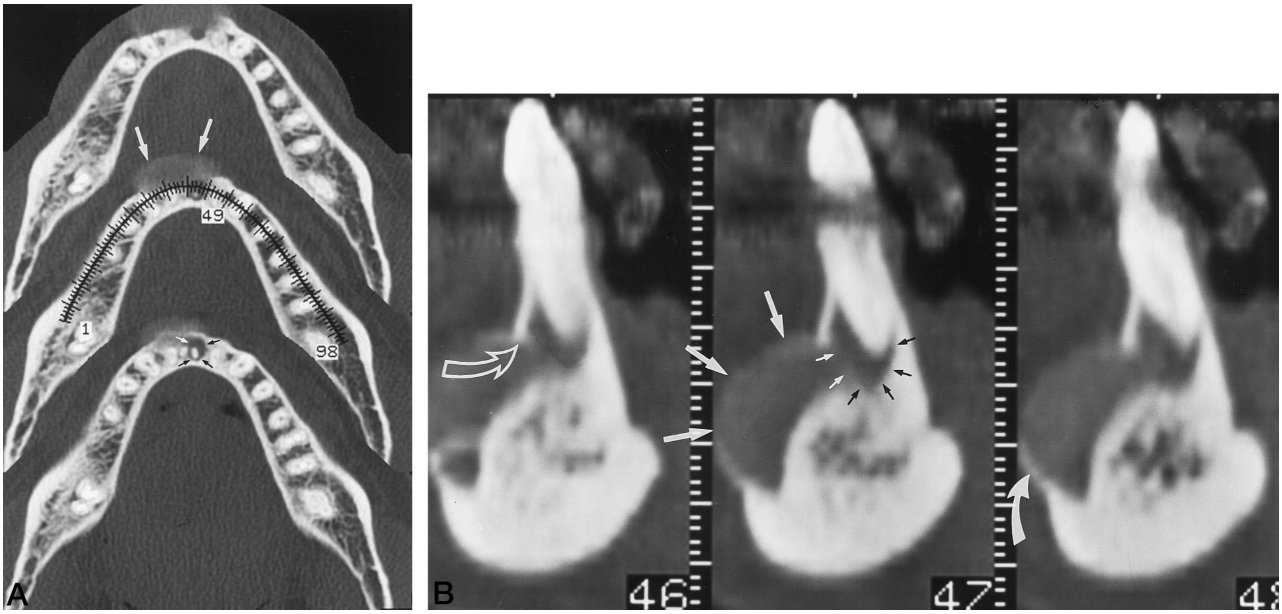


FIG 3. Axial (*A*) and cross-sectional (*B*) DentaScan images show a Silastic implant (*large arrows) that has eroded into a periapical abscess (small arrows*) surrounding the left central incisor. In *B*, the cortical margin is absent in the place in which the implant meets the periapical radiolucency (*open curved arrow*). Note how heterotopic new bone formation (*solid curved arrow*) tends to surround the implant.

**Bone defect from Silastic implants**

| Patient | Size of Defect, mm | | | Distance (in mm) from Root Apex | | Adjacent Teeth | New Bone Formation |
|---|---|---|---|---|---|---|---|
| | Depth | Width | Length | Cephalocaudad Direction* | Buccolingual Direction† | | |
| 1 | 3 | 15 | 42 | −4 | −3 | R central and lateral incisors§<br>L central and lateral incisors | Around and under implant |
| 2 | 3 | 14 | 30 | +2 | 0 | R central and lateral incisors<br>L central‡ and lateral incisors | Around implant |
| 3 | 1.5 | 10 | 30 | +1 | −2 | R central and lateral incisors<br>L central incisor | None |
| 4 | 4 | 12 | 14 | 0 | 0 | L central and lateral incisors | Through holes in implant |

Note—+ indicates mm cephalad or lingual to root apex; −, mm, caudad or buccal to root apex.
* 0 = at root apex.
† 0 = at root apex.
‡ Periapial lucency.
§ Giant cell reparative granuloma.

## Discussion

Dental CT software programs successfully show the erosive defects created by Silastic chin implants. More important, they clearly delineate the relationship between the defect and the root apices. We therefore recommend that symptomatic patients with chin implants be examined with this imaging technique. If the erosion is jeopardizing the root apex, then surgical removal of the implant should be a consideration. Patients who are asymptomatic should be closely observed clinically and perhaps should also have a DentaScan to determine the degree of erosion and its relationship to the teeth. If erosion is approaching the root apex, then prophylactic removal of the implant might be considered. Plain radiography may still have a roll in assessing the asymptomatic patient, for it can act as a screening test to determine the presence or absence of erosion. If erosion is present, a DentaScan would be needed to delineate its relationship to the root apex.

The bone erosion noted with chin implants is not seen with cheek or nose implants (5), which may be related to the fact that the overlying mentalis muscle applies pressure to the chin implant and bone, whereas the cheek and nose implants do not have overlying muscle. Robinson and Shuken (2) noted less erosion when the implant was placed in the inferior aspect of the mandible, where there is little pressure from the mentalis muscle and the bone is dense. Other factors may also affect bone erosion. When comparing implants placed above the periosteum with those placed below it, it has been demonstrated in rabbits that the implants placed above the periosteum create less erosion (3). Other studies in rabbits have shown that thick implants cause more erosion than thin ones (4). Migration of the implant can play a role in erosion. The bone in the superior aspect of the mandible in the alveolar process is less dense, and if an implant ends up in that position it is more likely to cause erosion and jeopardize the teeth that are located there (5). It seems, then, that erosion can potentially be minimized by using thinner implants and placing them above the periosteum in the inferior aspect of the mandible where the bone is thick and the pressure exerted by the mentalis muscle is minimal.

Because of this potential for erosion, one must question what alternative treatments exist. Horizontal osteotomies with advancement of the chin have been used successfully, but the surgery requires more time, has an increased morbidity, often requires hospitalization, and may have more complications (1). Implant surgery is relatively simple, and the erosive changes are benign in nature, as evidenced by the maintenance of a sclerotic cortical margin within the defect and the presence of viable bone adjacent to it. The use of these implants, therefore, continues, with close follow-up of the patients. Those having the surgery should be informed preoperatively that the implants may have to be removed at some point because of erosive changes. These changes appear quite frequently, although they may not be sufficiently advanced to require removal of the implant. In one study of children with Down syndrome, nine of 12 patients who underwent chin implantation had erosive changes (5); in another study, 12 of 14 patients showed mandibular bone resorption under the implants (2).

The close association of a giant cell granuloma with an implant in one of our patients raises the question of cause and effect. It is thought by some that giant cell granulomas arise from prior trauma or irritation (6). The possibility of a Silastic implant causing such irritation and leading to tumor formation must be considered; however, this has not been reported in the literature and certainly is highly speculative.

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