Classically, pterygoid plate fractures are common findings in skull-base and Le Fort-type fractures associated with blunt head and maxillofacial trauma. Originally described by René Le Fort in 1901, dissociating mid-face fractures can be categorized into 3 groups: type I, type II, and type III Le Fort fracture. In addition to the skull base, the pterygoid plates are in contact with the mandible via the medial and lateral pterygoid muscles. The medial and the lateral pterygoid muscles originate in the lateral pterygoid plate. The lateral pterygoid muscle typically inserts on the condylar neck and fibrous capsule, whereas the medial pterygoid muscle attaches to the medial aspect of the angle of the mandible. It would be reasonable to hypothesize that if great enough force were placed on the mandible it could lead to a fracture of the pterygoid plates; however, to our knowledge, this has not been previously described.

In all 3 fracture patterns, pterygoid plate fractures are a hallmark of Le Fort fractures. An example of a typical pterygoid plate fracture found in a Le Fort fracture is depicted in Figure 1, which shows fracture of both the medial and lateral pterygoid plates. Previously unappreciated facial fractures are more readily and reliably diagnosed with the availability of computed tomography (CT) scans. After blunt trauma, a finding of pterygoid plate fractures on CT radiography typically points to an underlying Le Fort fracture. In imaging studies that extend to only the skull base, associated fractures, such as those of the mandible, may be underappreciated. The objective of this study was to identify isolated lateral pterygoid plate fractures on CT scans in conjunction with mandibular fractures and to propose a mechanism of fracture unrelated to the classic dissociating mid-face Le Fort fractures.

Methods

After institutional review board approval was obtained from the University of California–Davis, the medical records of 7 patients with isolated lateral pterygoid plate fracture (not including Le Fort fracture, medial pterygoid plate fracture, or contralateral pterygoid plate fracture) between 2006 and 2012 at a tertiary medical center were evaluated. The CT scans of the face, cervical spine, and head were examined, when available. Informed consent was waived, as this study was found to be exempt.
Seven patients were identified with isolated lateral pterygoid plate fracture and associated mandible fractures between 2006 and 2012. All the patients were male, with a mean age of 37 years. The Table shows the types of fractures identified in each patient. All 7 patients had an ipsilateral subcondylar fracture, 2 had symphyseal fractures, 1 had a body fracture, another a parasymphyseal fracture, and 1 a coronoid fracture. Figure 2 depicts a patient with an isolated lateral pterygoid plate fracture. The CT scan of the head shows a lateral pterygoid plate fracture, but the mandible fracture is not seen. A separate CT of the face with thinner cuts revealing the subcondylar fracture in conjunction with the lateral pterygoid plate fracture is shown in Figure 3.

**Discussion**

Dissociating mid-face fractures are typically described by the 3 patterns of Le Fort fractures and can be readily diagnosed by physical examination and high-resolution maxillofacial CT scans. Classically, the finding of a pterygoid plate fracture on a CT scan points toward a dissociating mid-face fracture.5 As
Conclusions

In this series, 7 patients were identified with an isolated lateral pterygoid plate fracture without an associated Le Fort fracture. All 7 patients had an associated ipsilateral subcondylar fracture. In contrast to the typical Le Fort fracture patterns, these patients had a lateral pterygoid plate fracture on only 1 side, without involvement of the medial pterygoid plate or the contralateral pterygoid plates. Furthermore, unlike the transverse fracture of the pterygoid plates noted in Le Fort fractures, these patients had a vertical fracture pattern through the lateral pterygoid plate. Given the finding of an associated ipsilateral subcondylar fracture in all 7 cases, the mechanism of fracture is speculated to be due to force transduction through the pterygoid muscles during mandibular trauma. Other possible causes for isolated pterygoid fractures could be penetrating trauma, dental trauma during an oral procedure, and Le Fort injuries in which the fracture passes through the base of the pterygoid process. Although these are possible causes, none of the patients in this case series had such modes of injury, or associated injuries on imaging evaluation. Thus, in cases in which an isolated lateral pterygoid fracture is noted incidentally on a CT scan that extends to the skull base or CT of the cervical spine, a follow-up radiographic evaluation of the mandible may be indicated even when a mandible fracture is not suspected clinically.