

## *Spine University's Guide to* **Vertebral Osteonecrosis (Kummel's Disease)**



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## Introduction

*Kummel's disease* is a collapse of the vertebrae (the bones that make up the spine). It is also called *vertebral osteonecrosis*.

Physicians consider Kummel's disease to be a collapse of vertebrae (the bones that make up the spine), or a *vertebral body collapse* (VBC). It's not a common disease – only 10 cases have been reported over the past 30 years

## Causes

Kummel's disease is a disorder of the spine that usually occurs within about one year of injury to the vertebrae. It was discovered over a century ago when it was noticed that some patients became disabled after sustaining what was seen as a trivial or mild trauma. After months of no pain or discomfort from their original injury, the patients developed severe pain and/or worsening *kyphosis* (curvature of the spine). The curvature progressing into a so-called *dowager's hump*. A dowager's hump is a curve in the upper back that is caused by the inner or front part of the vertebrae collapsing, causing the spine to bend forward in an unnatural hump.

In the mid 1900s, H.H. Steel, identified five stages of Kummel's disease:

- 1.Initial injury:** this could range from being quite mild to severe; x-rays of the spine seem normal
- 2.Post-traumatic period:** minor back pain, but no loss of function or ability to continue with activities of daily living
- 3.Latent stage:** in this stage, the patient feels well, but may have minor symptoms
- 4.Recrudescent stage:** the patient begins to complain of increasingly severe pain, first in the area of the injury but then radiating
- 5.Terminal stage:** disc deterioration as developed and kyphosis may be present

A problem with this type of staging is that the first stage may be completely missed. If the injury was minor or of the symptoms are minor, they may not be noticed or documented. This may not cause any concern for either the patient or the physician. Research has shown that even if symptoms are present, the patient may be misdiagnosed with *idiopathic avascular necrosis* of the vertebral body. Avascular necrosis is the death of bone cells. Idiopathic means an unknown cause.

Another problem is the lack of imaging during the stage when the patient feels little or no pain or symptoms. If the patient does not have any symptoms and is in no pain there would be no reason for any tests to visualize the spine to see if there is any deterioration. In fact, there may not even be a primary or first imaging test, if the injury was minor and there are no symptoms.

Until fairly recently, physicians weren't able to follow up on the development of Kummel's disease because of the limited ability to visualize the spine and its discs. Even as imaging tests became available, the ability to see subtle fractures was limited. Technology has become more advanced and now delivers clearer and more in-depth images.

Because of these advances, there has been more interest in revisiting the disease and establishing what happens and why that leads to Kummel's disease.

## Diagnosis

Currently the diagnosis of Kummel's disease is made by x-ray or scanning. The diagnosis occurs when a physician sees evidence on x-rays or scans that one or more vertebrae in the spine are flattening and there is a vacuum left in the space. Other than this, there is no definitive test for the disorder. Kummel's disease is one of those diseases that is a *diagnosis of exclusion*. This means it is diagnosed when all other possible diagnoses have been ruled out.

Kummel's disease is not common. When it does occur, it is most often in patients with severe osteoporosis, patients who have taken long-term courses of corticosteroids, or those who have sustained a spinal injury. There are some patients who have a spontaneous occurrence of Kummel's disease; they are likely to have some sort of cancer or *osteomyelitis* (infection in the bone).

Recently there has been some debate about whether Kummel's disease is a true separate issue. Is the pain and disability just the appearance of symptoms of post-traumatic fractures in the spine that were previously without symptoms?

Some physicians feel that the disease is only present if the patient's x-rays did not show any signs of bone collapse at the time of the initial injury. The bone collapse was found later, after an extended period. However, this brings forward the problem that if the injury was minor, would an x-ray have been done?

There still is no consensus as to how severe the initial trauma had to be, how long the *asymptomatic* (no symptoms) period should be, what symptoms would be allowed during that period, and what types of tests should be used for the diagnosis of Kummel's disease.

In one case, researchers use the example of a patient who complained of persistent back pain eight months following what was considered to be a minor fall. This patient had history of type 2 diabetes (what used to be called adult-onset diabetes), *polyneuropathy* (nerve pain throughout his body), chronic obstructive pulmonary disease (a respiratory disease), obesity, and *hypothyroid* (under active thyroid), which happened after he had treatment for *hyperthyroid* (overactive thyroid).

The patient's back pain began as only occasional mild pain just after his fall. The pain got worse and intensified over a few weeks. He found it difficult to walk about two months

after the fall. At five months after the fall, he couldn't walk at all because of the pain and leg weakness. He also complained of numbness in his back and legs. He did not have any problems with his bowel or bladder.

This patient went to a hospital for assessment. He underwent a *magnetic resonance imaging* (MRI) scan of the thoracic (mid) and lumbar (lower) spine. The physicians noticed that there was an injury between the vertebrae at the T9-T10 levels, fairly low in the mid-back. To follow up, the physicians used *computed tomography* (CT) imaging to take a *biopsy* (sample) because they suspected that it could be *malignant* (cancerous).

Following the biopsy, the patient received *radiation therapy* (intense x-rays pointed directly at the specific area in the back) for two weeks. After the two weeks, a repeat MRI and CT scan showed that the initial injury was still there but the fluid that had built up was now gone. The physicians performed another CT biopsy to check for infections or fungi, neither of which was found in the samples. The patient then had CT scans of his chest, abdomen, and pelvis to see if there were any signs of problems there, but none were found. He also underwent a *positron emission tomography* (PET) scan, a test that provides three-dimensional images, which also didn't show any issues.

Eight months later, another MRI showed that the injury was beginning to cause *spinal stenosis* (narrowing of the spinal canal). Spinal stenosis puts pressure on the spinal nerves and can become quite severe. At this point, the patient underwent another CT biopsy for infection and fungi, but again, nothing was found. This is when the physicians diagnosed Kummel's disease.

The patient had surgery to remove fragments from the vertebrae and to stabilize the spine. The surgery was successful. The patient said

that at nine months after surgery, he had no pain, his numbness had improved, and he was once again able to walk.

The diagnosis of Kummel's disease is still not defined and there are no guidelines for tests. It's important for physicians to keep in mind the different conditions or illnesses that can be present and may be a cause of Kummel's disease. These include various cancers, infections, osteoporosis, long-term use of steroids, radiation treatments, *vasculitis* (inflammation of the blood vessels), *pancreatitis* (inflammation of the pancreas), and *cirrhosis* (liver disease), or a minor fall.

The tests that should be done to help rule out other diseases or disorders include blood tests, an MRI to rule out bone tumors, as well as other tests such as bone scans and biopsies, depending on the patient's history.

The cause, symptoms, and diagnosis of Kummel's disease is very individual. The treatment of Kummel's disease is also very individual. Physicians have to take into account the initial injury that caused the disease, the patient's current state, and what further damage may be done.

## Notes