What Is Sclerotic Bone and Why Is No One Talking About It?

You have heard Dr. Steiner comment on sclerotic bone, but I am sure you have not heard the following from others in the dental field.

Sclerotic bone is very common in orthopedics and it is common in jaws also but there is a big difference between the two fields.

In orthopedics, sclerotic bone is produced as a result of inflammation in joints that creates sclerotic bone under the damaged articular cartilage. Sclerotic bone is a primary feature in osteoarthritis. However, sclerotic bone in the jaws is usually the result of the dentist creating sclerotic bone.

Sclerotic bone forms as a result of inflammation. In the jaws, sclerotic bone is usually created by placing bone graft materials that create inflammation that result in the production of sclerotic bone. Sclerotic bone formation is most often a result of placing foreign proteins in the jaw via either cadaver bone or the foreign animal proteins found in Bio-Oss.

This inflammation is a result of your patients' immune system reacting to the donor protein that is not matched. The greater the inflammatory reaction the more intense the bony sclerosis becomes. For that reason, when grafting with Bio-Oss which contains animal proteins, an increased inflammatory reaction is produced with the greatest amount of bony sclerosis. These Bio-Oss grafted sites radiographically show intense mineralization.

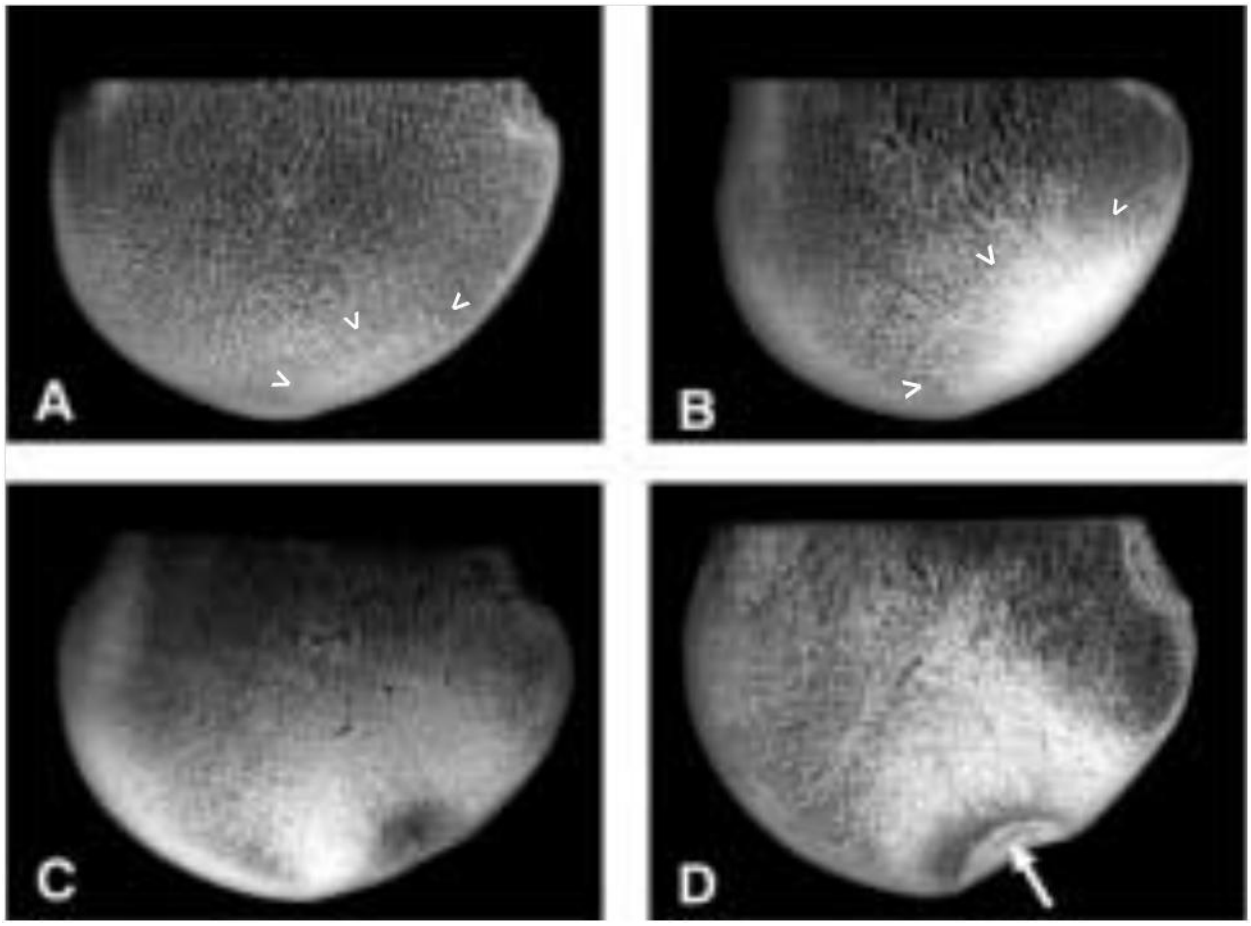
A dental radiologist would describe these areas of dense mineralization as sclerotic bone. Allografts do not produce as intense of an inflammatory response because the foreign proteins are human and more closely matched. For allografts, the density of the sclerosis is not as great as found in Bio-Oss but histologically, the bone produced is also diagnosed are sclerotic bone.

Orthopedic surgeons cut out sclerotic bone and replace the joint with a joint replacement. Dentists create the sclerotic bone and put implants into the sclerotic bone. Sclerotic bone is very dense and that is why allografts and Bio-Oss are popular graft materials. But there is a significant downside to sclerotic bone.

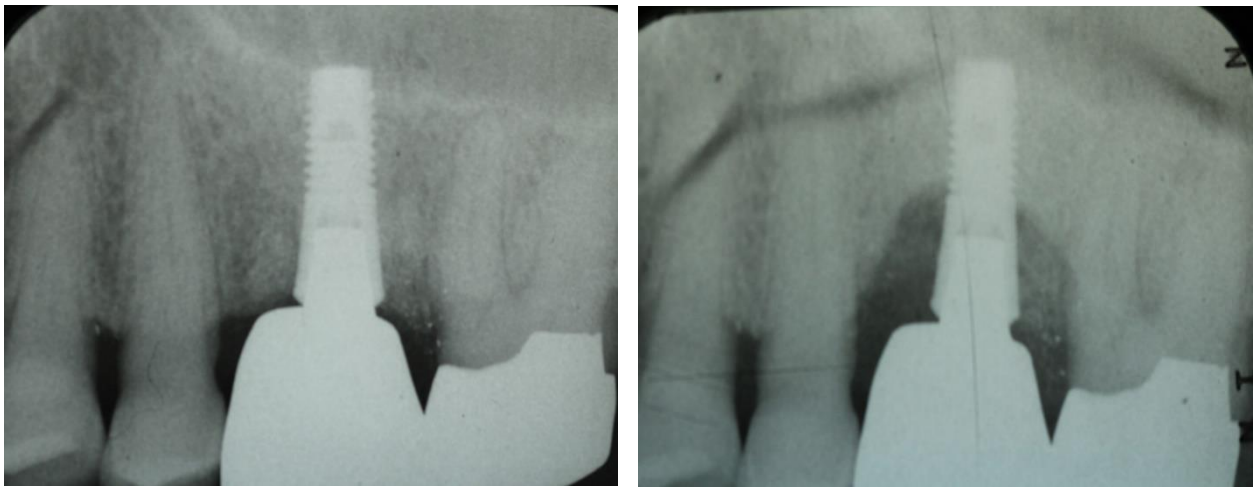
The downside of sclerotic bone is that once formed it will never remodel and when it fails it breaks apart. The retained bone graft particles are never resorbed and are encased in mineralized sclerotic bone. We all know that any biologic system that cannot adapt will eventually fail and that is what happens with cadaver bone and Bio-Oss.

The following, will discuss the process of how sclerotic bone forms.

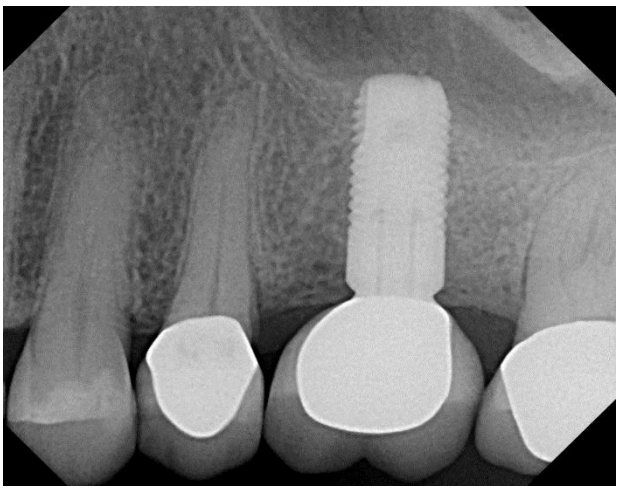
The following radiographs show how sclerotic bone forms in a joint and leads to bone failure. The white arrows in box A point to the area of initial injury and the beginning of the formation of sclerotic bone. In box B, the white arrows point to a much larger area of sclerotic bone as injury to the joint continues. Box C, shows how the sclerotic bone is beginning to collapse and Box D, shows terminal collapse of the sclerotic bone and joint failure.

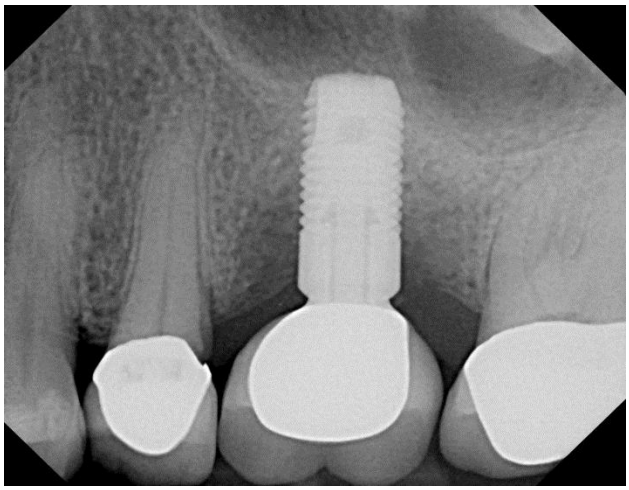


The process is no different for sclerotic bone formed in the jaws. The following radiographs are from a patient grafted with Bio-Oss prior to implant placement. In the left radiograph, everything is doing well for a few years, but in a short period of time, the bone has broken down and a significant lesion appears. The granulation tissue of this lesion is filled with bone chips as a result of breaking up of the sclerotic bon

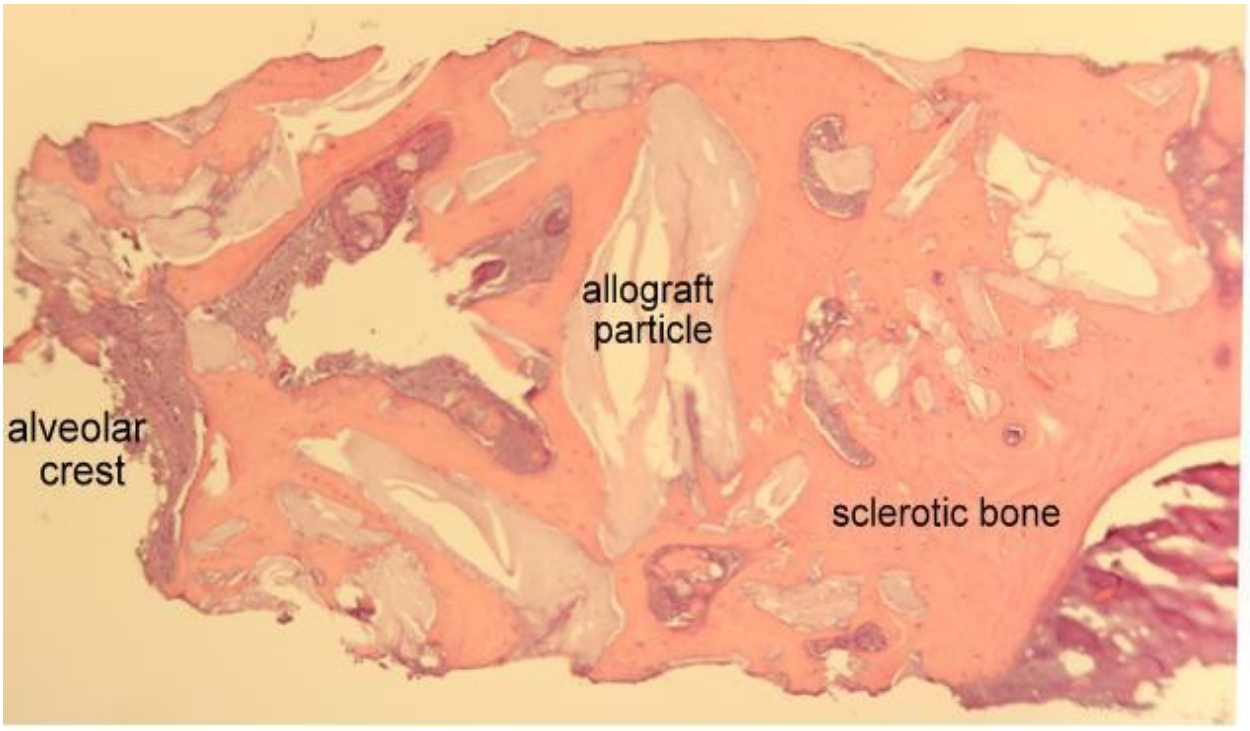


In the following radiographs the implant site had been grafted with cadaver bone prior to implant placement. Everything was fine for a few years, but over a short period of time, the sclerotic bone failed. Again, the granulation tissue is filled with bone chips that results in the breaking up of the sclerotic bone. Bone chips are not found in the granulation tissue when an implant fails because of periimplantitis. In periimplantitis, the bone is resorbed and does not break up.

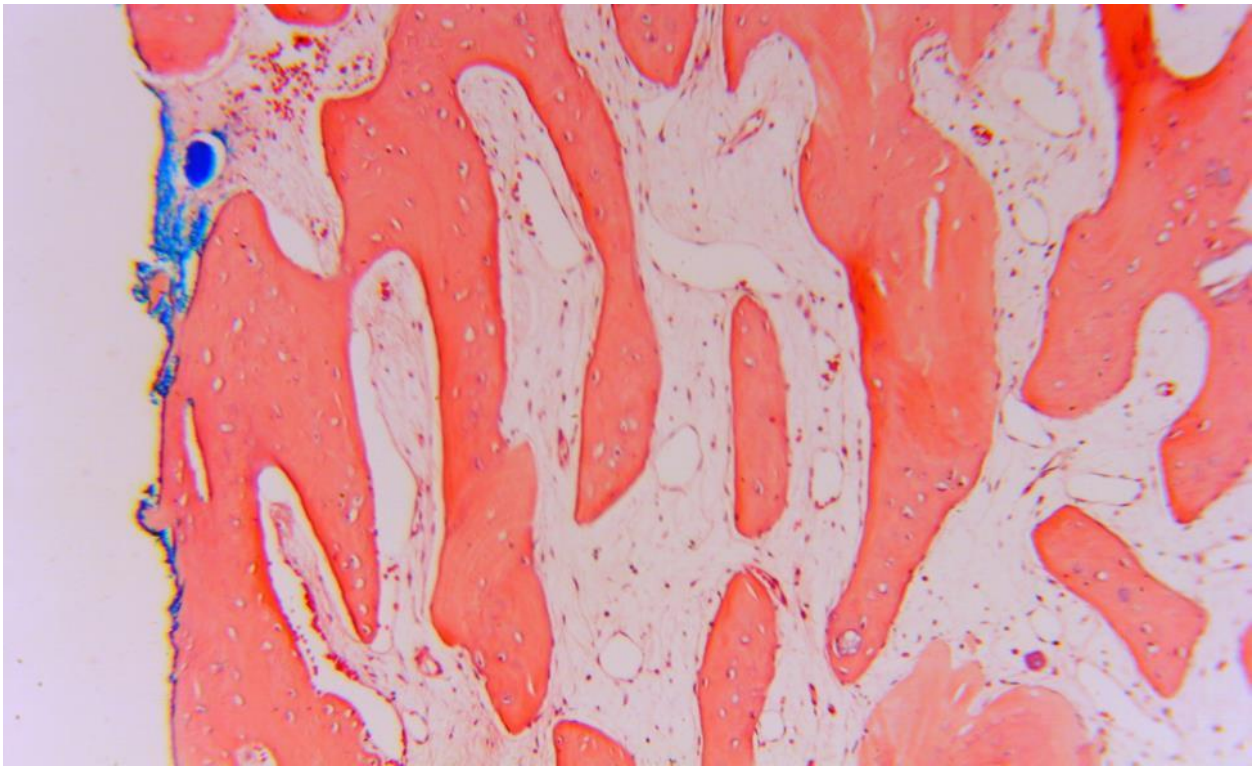




The following histology (pathology) is from a site grafted 6 months prior with an allograft. There is nothing normal about this tissue. This tissue is composed of retained allograft particles encased in mineralized tissue. There are very few blood vessels and no trabeculae. This tissue lacks the ability to remodel because it lacks osteoclasts and it will stay like this until it fails. This is the image of sclerotic bone.



The following histology is from a periodontal lesion regenerated with Steiner Biotechnology bone graft materials. The bone has normal trabeculae (beautiful to us) with soft connective tissue filled with blood vessels and most importantly, no inflammation. This is normal healthy vital bone. This tissue will respond to forces placed upon it, adapt to those forces and will not fail.



Before Steiner Biotechnology began pointing out that implant failure was a result of bone failure, no one ever considered bone as a reason why an implant failed.

Because no one looked at bone as the reason for the failure this is why the failures resulting from graft materials that produce sclerotic bone have been overlooked. With the number of allografts and Bio-Oss bone grafts placed by dentists, you are surly asking yourself, how can this material be so common and yet no one in the dental field knows they are placing bone graft materials that produce sclerotic bone? The reason is simple. No one in dentistry knows what sclerotic bone looks like. No one in dentistry has formal training in bone histology or bone pathology.

When histologic studies are done on bone and bone graft materials, the groups doing this research look at the percent of mineralization per area, the percentage of retained graft particles and the bone volume but no one comments on the type of bone produced because they do not have the training to identify the tissue accurately.

There are over 200 histologic scientific papers published on cadaver bone alone and not one article describes the bone as sclerotic bone- except one. The following article *Alveolar Ridge Augmentation: Comparison of Two Socket Graft Materials in Implant Cases. Len Tolstunov, DDS; and Jibin Chi, MD, MBA, MBI* was published in the Compendium and compared an allograft (Puros) and Bio-Oss. The authors of the article wanted an assessment of the vascularity of the sites grafted with the two graft materials and they wisely enlisted the help of UCSF oral pathologist

Dr. Richard C. K. Jordan. Dr. Jordan has a DDS degree and a PhD in pathology who is a professor of pathology at UCSF. No one knows more about the histology and pathology of the jaws than Dr. Jordan. The article summarizes Dr. Jordan's findings regarding the type of bone produced as follows:

"The UCSF laboratory results at 3 months after the bone graft for the Puros side was positive for sclerotic lamellar and woven bone with inflammation…"

A portion of a table from the article describes both cadaver bone and Bio-Oss as producing sclerotic bone with inflammation at 3 months.

3-MONTH FOLLOW-UP, PREOPERATIVE STAGE 1 EVALUATION			
Clinical	SPS	15 mm x 9 mm x 7 mm	15 mm x 9 mm x 7 mm
Radiographic		Socket is not visible	Socket Outline Present
Histolocial at UCSF	Bone Healing: quality and quantity (0% - 100%)	Sclerotic woven and lamellar bone with inflammation. No foreign material (100%)	Sclerotic bone with inflammation and foreign material present (100%)
	Vascularization (0-10)	5	5

Both the allograft and Bio-Oss samples produced sclerotic bone with persistent inflammation. A graft material must be biocompatible to produce normal bone and no inflammation can be found in the grafted site if normal bone formation is to take place.

Dentists become very offended when they are told that the bone produced by allografts and Bio-Oss is sclerotic bone. Dentists have been told so many times by lecturers that the bone formed by cadaver bone and Bio-Oss is normal healthy bone that this becomes accepted as fact. When dentists tell patients that allografts produce normal bone they are wrong. The bone produced by these materials are pathologic, inflamed, unable to remodel and in time will fail. Failure of sclerotic bone produced by allografts is becoming the biggest reason for implant loss.