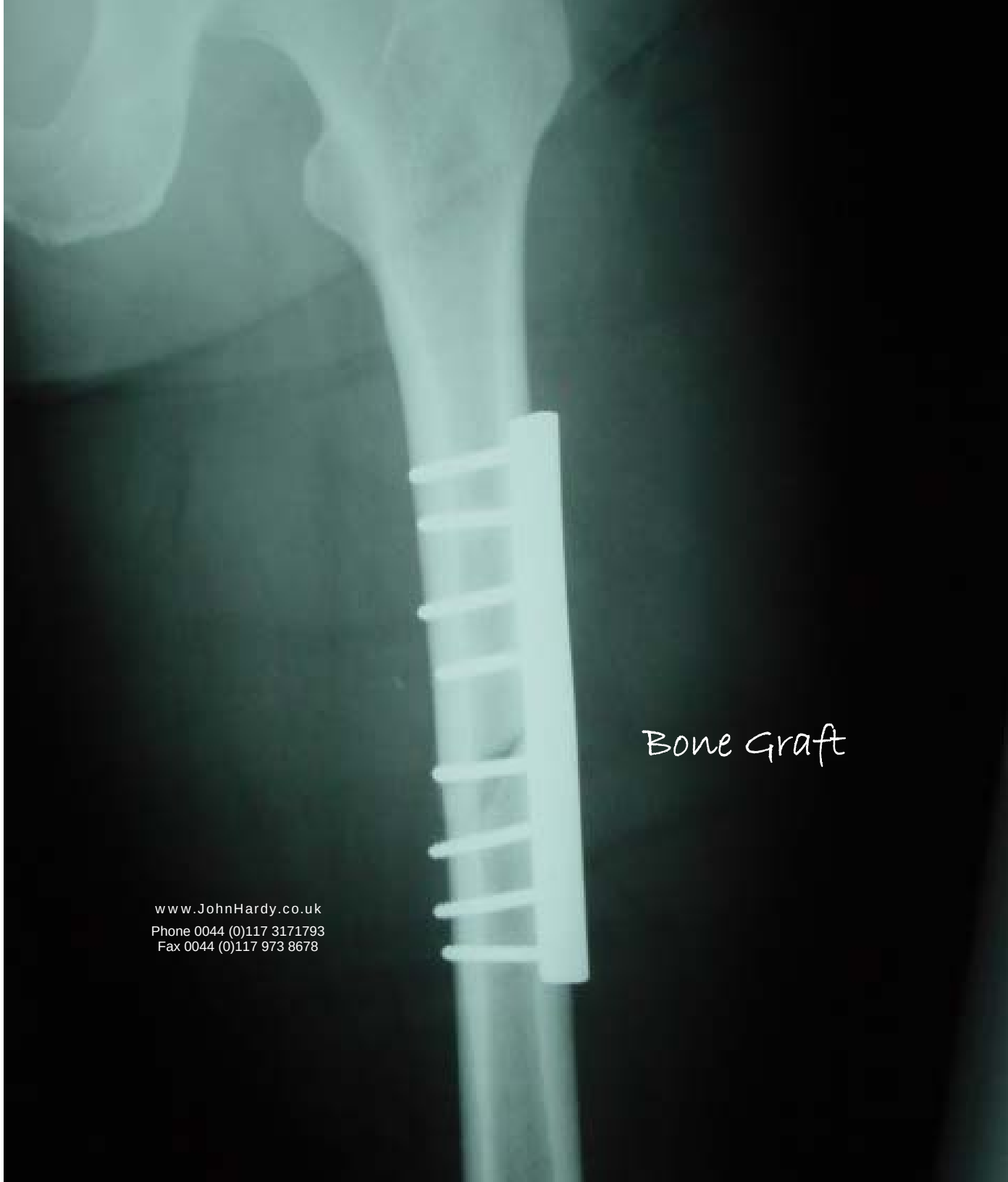
BONE GRAFT (CONTINUED)

Over the years research has evolved protein factors that can promote bone growth. Purified forms of these substances are called bone morphogenic proteins (BMP). There are many types of BMP available. The current approved form begins as a powder that is reconstituted and absorbed into a collagen sponge made from bovine tissue. This sponge is then inserted into a defect like a break in the shin bone that is not healing or to fuse a spine after surgery.

Ceramics can be used as a substitute for bone grafts. The best advantage is that these are cheap, can be manufactured in many forms such as porous and mesh and offer no possibility for disease transmission. Some can be associated with an allergic type of inflammation in some patients. While ceramics provide a framework for bone growth, they contain none of the natural proteins that influence bone growth. Coral form sea creatures has been shown to be useful in the treatment of bone defects. It is most often used for spinal surgery as a graft additive or bulking agent.

Your Orthopaedic and Trauma Surgeon will discuss all of the bone grafting options with you to help you decide what is best for you.



Bone Graft

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BONE GRAFT

INTRODUCTION

Your surgeon has recommended you have a bone graft procedure. This may be part of a bigger operation. It may also be one of a number of types of bone graft:

1. Autograft: This means the bone that comes from another part of yourself and be used on you to strengthen your own bone.

2. Allograft: This means that the bone will come from another patient to be used to strengthen your own bone

3. Xenograft: This is graft from another species that is used to strengthen your own bone.

WHAT ELSE SHOULD I KNOW?

Autologous (Autograft) refers to tissues that are reimplanted in the same individual they have come from. Many tissues, like bone and tendon, can be used in this way. In Orthopaedics and Trauma autograft can be associated with donor site problems due to the type or volume of graft required. The advantages of autograft are the reduction of cross infection risk and allergen risk. For bone allograft the cross infection risk is not as great as if the graft was blood or a blood product transfusion. The disadvantage of allograft is that for bone the surgeon could be "robbing from Peter to pay Paul". In other words, there is a risk associated with removing healthy tissue from one part of the body to place it as a graft of dead tissue in another. The commonest site to harvest bone from is the rim of the pelvic bone near the hip. However, if too much is taken there is a risk of breaking the pelvic bone that is weakened by removing the normal bone. It can also be very painful to have bone removed from the rim of the pelvis because this is the attachement of the abdominal muscles. For this reason a surgeon may recommend that he supplements the autograft with allograft. Bone allograft for large operations come from femoral heads donated by patients undergoing hip replacement surgery. This has disadvantages over the newer preparations of bone allograft. Your surgeon may then recommend methods other than autograft or a combination such as bone allograft alone, bone morphogenetic proteins and synthetic graft materials to reduce the risk of donor site morbidity or supply a need not available from autograft.

FRESH FROZEN ALLOGRAFT

The benefit of fresh frozen allograft is the volume available to the surgeon. The bone graft comes as femoral heads that have to be ground up at the time of surgery. As there is no carrier the graft is loose and difficult to form and maintain its position where it is needed. The risks are the risks of infection from bacteria (up to 22% in some series[1]). The risk of bacterial infection can be reduced if the bone graft is irradiated. However this affects its strength. Also there is a risk of viral infection though this is low because of stringent tests to exclude Hepatitis B, Hepatitis C and HIV on the live donors. Studies indicate that the risk of contacting HIV infection through the use of allograft bone is less than 1 per 1 million uses. Another risk of the fresh frozen bone graft is that it often comes from elderly patients and so the potential for this bone to stimulate the formations of new bone by the patient once implanted is poor (poor osteoconductivity).

[1] Sommerville SM, Johnson N, Bryce SL, Journeaux SF, Morgan DA. Contamination of banked femoral head allograft: incidence, bacteriology and donor follow up. Aust N Z J Surg. 2000 Jul;70(7):480-4.

THE NEWER ALLOGRAFTS

Newer allograft materials are becoming available all the time to improve on the osteoinductive properties (Optiform® and Optifill®). These materials are 100% biological, demineralized bone matrix (DBM). Osteoinductivity demonstrated by independent and internal studies. There are a number of advantages and disadvantages to these products. Newer allografts become resilient solids at body temperature. The carrier medium supplied by the manufacturer keeps graft in place. However, there is little structural strength as with some autograft and fresh frozen aoolgraft. Because these are commercial products quality & safety is a big issue. The sterility, lack of viral particles and osteoconductivity is verified using the most advanced, reliable techniques available. Only DBM material that is demonstrated histologically to be osteoinductive is used. Donor bone is tested using the most stringent techniques, including Polymerase Chain Reaction. All donated material is screened for HIV, hepatitis and syphilis. Another advantage of these newer commercial allografts is that some of them are capable of being delivered through a syringe. This has advantages when the graft is used to fill the holes left by screws when they are removed in professional athletes to reduce the subsequent risks of fracture through the remaining screw hole.

New allografts can now be used to reduce the risk of refracture following screw removal in athletes.

OTHER TYPES OF BONE GRAFT

Success in bone grafting can be affected adversely by a patient's age, smoking, steroid use, diabetes and kidney failure to name a few causes.