

# **RADIATION TO PREVENT IMMOBILIZATION OF THE HIP JOINT AFTER TRAUMATIC FRACTURES**

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It has been known for many years that radiation is useful for patients with hip disease especially undergoing hip replacement to prevent ossification or bony restriction of movement.

After traumatic fracture and hip replacement many patients develop calcium deposits throughout the joint space. These calcium deposits freeze the movement of the joint so the patient is often left with a hip that does not move, markedly restricting activities.

A variety of studies have shown that radiation when promptly used can decrease the likelihood of this complication. This is a benign condition where radiation has a marked therapeutic benefit.

Hip replacements for many years have been followed by radiation especially in select centers geared to producing the best results. The mechanism of action in most patients with traumatic fracture of the hip is similar. If patients have traumatic fracture of the hip, there may be associated low blood pressure, inadequate oxygenation and bleeding into the tissues which may produce marked local effects.

A report dating back ten years ago shows that post-operative radiation in 30 patients with traumatic fractures of the hip showed a marked reduction in heterotopic ossification falling from 50% to 10% using historic controls. This would suggest many could benefit with improved mobility. It is thought many more patients could benefit if they receive radiation after hip replacement - especially if having a history of calcification in the joint space or trauma causing the hip fracture.

A current paper published by Haas et al, in the prestigious International Journal of Radiation Oncology Biology and Physics evaluated 66 patients seen in a trauma center. The referral for radiation was based upon the orthopedic surgeons advice only. It was not a randomized experiment.

Most patients either received 800 rad in one fraction or 1000 rad in five fractions. Rad is a measurement of radiation dose. Fractions are the number of radiation treatments. Patients were then followed at least six months after to determine the presence of heterotopic ossification or calcification of joint space. It is thought that if calcium is to deposit in the joint space it will do so quickly after surgery. That is why radiation is delivered so promptly. Recently a patient came to us months after surgery who was not offered radiation elsewhere. Unfortunately, this is too late. In our own institute, treatment is carried out most commonly within 24 hours after surgery.

Follow-up is available on 47 patients consisting of 33 men and 14 women with a median follow-up of 8.5 months and a range of 6 to 100 months. Only six patients developed Grade III heterotopic ossification and there were no Grade IV heterotopic ossifications.

What causes this ossification of the hip joint? It was thought to be a primitive cell of the body that could differentiate into a variety of different forms. It is called a mesenchymal cell. Following manipulation of the hip joint, this cell could change into bone-forming type. This is what produces the untoward effect.

Researchers have found this response can occur within 16 hours of the trauma, peaking in about a day and a half. It is estimated that 200,000 Americans have hip replacements annually and then 30% have evidence of significant ossification. This would suggest that radiation can positively affect tens of thousands of Americans each year.

Early reports show that prompt radiation would diminish heterotopic ossification. Some estimate that the risk after trauma to be up to 70% of ossification within two months of repair. Since radiation has been known to decrease this adverse effect a study was prompted. There was only 10% severe ossification in the irradiated hips compared to 50% in non-irradiated controls which would suggest marked benefit for the use of radiation of this benign condition.

Also, studies showing that a single treatment is equivalent to fractionated or divided dose means more comfort for the patient who can easily go through one treatment even despite repair of the broken hip.

While this study looked at radiation after surgery for broken hips, there are ongoing studies evaluating radiation given before surgery to see if heterotopic ossification can be prevented or diminished in that fashion.

Competing modalities of treatment include non-steroidal anti-inflammatory medicines - yet they are associated with side effects to the intestines, bleeding and wound healing. Some have suggested significant side effects - including deaths - in thousands undergoing medical rather than radiation therapy. This also gives an added emphasis to the potential benefits of radiation.

The dose of radiation is felt to be safe. Several studies have found no evidence of tumor induction using this low dose of radiation with no cancer being found in the treated field.

Thus, radiation after traumatic fracture of the hip improves function of the hip by preventing inappropriate calcium deposit in the joint space. Usually just one radiation treatment is given. Actual treatment time is about ten minutes. There is a simulation or mapping out performed prior to the actual treatment to confirm delivery of the radiation the correct spot.

Treatments are painless, quick and are likely to lead to long-term benefits. Unfortunately, patients must know about this treatment option early since delayed implementation of radiation is probably useless.

Those going through hip replacement surgery for any reason should discuss with their surgeon the risks, benefits and alternatives to post-operative radiation to the hip joint to attempt to prevent this motion-limiting complication.

We are happy to discuss the use of radiation administered immediately after surgery to help maintain function of the hip. It's best to also discuss this with your orthopedic surgeon prior to surgery so issues are addressed and no surprises occur later in this regard. For questions, call us at 212-CHOICES or e-mail to [gil.lederman@rsny.org](mailto:gil.lederman@rsny.org).