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John P. Salvo
Rothman Institute

Jake Zarah
Thomas Jefferson University

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Surgeon Radiation Exposure in Hip Arthroscopy: A Prospective Analysis

John P. Salvo, MD¹, Jake Zarah, MD²

¹Rothman Institute, Marlton, NJ, USA, ²Thomas Jefferson University Program, Philadelphia, PA, USA.

Objectives: Hip arthroscopy is an established field within orthopaedic surgery. The majority of the procedures involve repairs of the acetabular labrum and arthroscopic treatment of femoroacetabular impingement (FAI). The procedures are being performed with increasing frequency annually. Fluoroscopic guidance is recommended during these procedures, and radiation exposure to the surgeon, staff, and patient remains a valid concern. The purpose of this study is to measure radiation exposure to the surgeon during hip arthroscopy and determine if this exposure remains below recommended annual occupational radiation exposure thresholds recommended by the International Committee on Radiological Protection (ICRP).

Methods: Prospectively, radiation exposure was measured for a single surgeon at a single outpatient facility for all hip arthroscopic procedures over a three-year period. A radiation dosimeter was worn outside of the surgeon's chest on the lead apron. Standard pre-operative and intra-operative imaging was used for all patients. Radiation readings were prospectively measured for deep dose equivalent (DDE), lens dose equivalent (LDE), and shallow dose equivalent (SDE). The cumulative radiation exposure was tabulated in millirem (mrem), converted to milli-Sieverts (mSv) (standard measurement used by the ICRP) and then the per-patient exposure calculated as well as annual exposure for 100 hip arthroscopies per year.

Results: Between July 2011 and July 2014, 209 patients underwent a total of 280 hip arthroscopy procedures at a single facility by a single surgeon. There were 90 labral repairs, 83 femoroplasties, 26 acetabuloplasties, 66 labral debridements, 8 trochanteric bursectomies, and 7 iliopsoas releases. The cumulative DDE was 183 mrem (1.83 mSv), LDE 183 mrem (1.83 mSv), and SDE 176 mrem (1.76 mSv). The calculated per patient exposure for the surgeon was DDE 0.875 mrem (0.00875 mSv), LDE 0.875 mrem (0.00875 mSv), and SDE 0.842 mrem (0.00843 mSv). Calculated annual exposure for a surgeon performing 100 hip arthroscopies per year are DDE 8.75 mrem (0.0875 mSv), LDE 8.75 mrem (0.0875 mSv), and SDE 8.43 mrem (0.0842 mSv).

Conclusion: Hip arthroscopy & hip preservation procedures are being performed with increasing frequency annually. Fluoroscopic guidance is recommended for safe entrance into the central compartment and during various parts of the procedures. Radiation exposure to the surgeon, staff, and patient is a valid concern. The ICRP sets recommended annual safety thresholds for occupational radiation exposure. Current annual safety thresholds are 50,000 mrem (500 mSv) to the hands, 50,000 mrem (500 mSv) to the skin, hands & feet, 15,000 mrem (150 mSv) to the eye, and 30,000 mrem (300 mSv) to the thyroid of healthcare workers. Our study shows surgeon radiation exposure below the annual safety thresholds recommended by the ICRP for 100 cases per year. For surgeons performing more than 100 hip arthroscopic procedures annually, the exposure will be higher. Appropriate safety equipment such as lead aprons, thyroid shields, and leaded glasses are still recommended, especially for high volume hip arthroscopists.

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