

Radiation Safety for Pain Physicians: Technique or Equipment

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Anatomic landmarks are useful for simple interventional techniques in pain clinics. However, for more accurate and efficacious procedures, several types of medical devices, such as CT, MRI, ultra-sonography and fluoroscopy, have been used. Fluoroscopy provides continuous visible images during a diagnostic or interventional procedure. It is very useful and effective, but ionizing radiation exposure is a major problem. The adverse effects of ionizing radiation on the human body include skin diseases, cataracts, and some cancerous conditions such as thyroid cancer or brain tumor [1].

Several radiation protective utilities, including aprons, thyroid shields, gloves, caps, eyewear, lead barriers, and table-side lead drapes are applied to protect the pain physicians during fluoroscopic procedures. In previous studies, radiation-protective aprons and thyroid shields were found to be the most widely used utilities for radiation safety [2,3]. Radiation-protective aprons, with an equivalent thickness of 0.25–0.35 mmPb, provide a radiation attenuation effect up to 90–95% [4].

In this issue of the Korean journal of pain, Kim et al. [5] present an effective method for reducing radiation during C-arm fluoroscopy-guided pain interventions. In the current study, they studied the radiation-protective efficiency of radiation-reducing gloves. They compared effec-

tive doses (EDs) from the two dosimeters that were measured at the side of the table (Group 1) and at a location 20 cm away from the side of the table (Group 2) with/without radiation-reducing gloves. The RAD-adjusted mean ED without the gloves was 35.6 μ Sv in Group 1 and 9.5 μ Sv in group 2. Meanwhile the RAD-adjusted mean ED with the gloves was 26.2 μ Sv in Group 1 and 7.2 μ Sv in group 2. They concluded that the radiation-reducing gloves decreased scatter radiation by 26.5% in Group 1 and 25.8% in Group 2. This result also showed that a longer distance of only 20 cm from the side of the table can reduce scatter radiation by 73.3%. Consequently, they recommended the method of pulling back the physician's hands, as this method can be a more effective and cost-effective means of radiation safety as compared to wearing radiation-reducing gloves.

Radiation exposure is a very important and delicate issue for people who work in area of occupational radiation. The authors reported several papers about radiation safety and protection methods. They revealed the importance of the fluoroscopic mode during procedures [6]. The use of pulsed and low-dose modes together significantly reduced the RADs compared to the conventional mode. Also, the distance from the radiation source and the position of the body of the practitioner are correlated with the radiation dose [7,8].

Received March 13, 2014. Accepted March 14, 2014.

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Many physicians wear aprons and thyroid shields to protect them from radiation during fluoroscopic procedures. However, aprons and protective shields that have been used for a long period of time can have a higher risk of damage. Therefore, the authors recommended that radiation-protective shields should be inspected regularly and exchanged for new products for the safety of physicians [9]. In Korea, radiation safety education has not been mandatory for pain physicians, and the attention given to radiation safety may be even less. Park et al. [2] reported in a comparison of a radiation safety education group and a no-education group that, the rate of wearing radiation-protective glasses or goggles and the use of radiation badges or dosimeters were both significantly higher in the education group. They concluded that to make fluoroscopy use safer, education about radiation safety should be required for pain physicians.

It is important for physicians to wear as many radiation-protective shields as possible and remain at a safe distance from the radiation source. Ultrasound has been usually used to avoid radiation exposure at present. Nonetheless, c-arm fluoroscopy remains an attractive device. Therefore, further studies are required in an effort to reduce radiation exposure before the routine use of this device can be realized in clinical settings.

REFERENCES

1. Cousins C, Sharp C. Medical interventional procedures—reducing the radiation risks. *Clin Radiol* 2004; 59: 468–73.
2. Park PE, Park JM, Kang JE, Cho JH, Cho SJ, Kim JH, et al. Radiation safety and education in the applicants of the final test for the expert of pain medicine. *Korean J Pain* 2012; 25: 16–21.
3. Kim C, Vasaiwala S, Haque F, Pratap K, Vidovich MI. Radiation safety among cardiology fellows. *Am J Cardiol* 2010; 106: 125–8.
4. Mori H, Koshida K, Ishigamori O, Matsubara K. Evaluation of the effectiveness of X-ray protective aprons in experimental and practical fields. *Radiol Phys Technol* 2014; 7: 158–66.
5. Kim AN, Jang YJ, Cheon BK, Kim JH. How effective are radiation reducing gloves in C-arm fluoroscopy-guided pain interventions? *Korean J Pain* 2014; 27: 145–51.
6. Cho JH, Kim JY, Kang JE, Park PE, Kim JH, Lim JA, et al. A study to compare the radiation absorbed dose of the C-arm fluoroscopic modes. *Korean J Pain* 2011; 24: 199–204.
7. Jung CH, Ryu JS, Baek SW, Oh JH, Woo NS, Kim HK, et al. Radiation exposure of the hand and chest during C-arm fluoroscopy-guided procedures. *Korean J Pain* 2013; 26: 51–6.
8. Baek SW, Ryu JS, Jung CH, Lee JH, Kwon WK, Woo NS, et al. A randomized controlled trial about the levels of radiation exposure depends on the use of collimation C-arm fluoroscopic-guided medial branch block. *Korean J Pain* 2013; 26: 148–53.
9. Ryu JS, Baek SW, Jung CH, Cho SJ, Jung EG, Kim HK, et al. The survey about the degree of damage of radiation-protective shields in operation room. *Korean J Pain* 2013; 26: 142–7.

1. Cousins C, Sharp C. Medical interventional procedures—