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Letter

Localized anagen effluvium and cataract development following an extended fluoroscopic interventional procedure

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Abstract

The skin and the eyes are prone to radiation-induced injury in fluoroscopic procedures. The degree of injury is related to various exposure and patient-related factors. We report a man who presented with an alopecic patch on the left occipital scalp following an extended fluoroscopically-guided endovascular procedure. He subsequently experienced complete hair regrowth, but was later diagnosed with a cataract in his left eye. To our knowledge this is the first report of both anagen effluvium and cataract development in a patient following fluoroscopic radiation exposure. It is important for dermatologists to be aware of these mucocutaneous side effects of radiation exposure to ensure proper management.

Key words: alopecia; radiation hair diseases; radiation injuries; skin radiation

Case synopsis

A 48-year-old man presented with an alopecic patch on the left occipital scalp. Prior to the development of this patch, he underwent an extended fluoroscopically-guided endovascular procedure to treat a left middle cerebral artery infarct. He reported the patch developing within 2 weeks after the procedure. On physical exam, the patient had a square-shaped, well-demarcated alopecic patch on the left occipital scalp (Figure 1).



Figure 1. Clinical photograph of affected scalp 2 weeks following the procedure; a square shaped, well-demarcated, alopecic patch.

There was no erythema, scale, or fibrosis noted. A hair pull test was negative. He denied any pruritus or pain within the alopecic patch but noted a tingling sensation prior to his hair loss. The patient experienced complete hair regrowth within 2-3 months (Figure 2) and he was subsequently diagnosed with radiation-induced temporary alopecia (localized anagen effluvium) following an endovascular interventional procedure involving the intracranial circulation. Nearly two years after the procedure, he was also diagnosed with a cataract in his left eye.



Figure 2. Clinical photograph of affected scalp 3 months following the procedure – Complete regrowth of the occipital scalp hair.

Discussion

Extended fluoroscopically-guided procedures are becoming more common. Although cutaneous side effects secondary to radiation exposure during fluoroscopy are rare, skin changes such as erythema, alopecia, ulcers, and dermal atrophy have been reported. The extent of radiation exposure complications varies depending upon exposure-related factors, including total dose, dose rate, dose fractionation, and duration of exposure [1, 2, 3, 4]. Patient-related biological factors that increase the risk of

radiation exposure complications include smoking, diabetes mellitus, poor nutritional status, a history of high radiation dose from a prior procedure, and the location of the irradiated skin [1, 2].

Although the skin of the scalp is reportedly resistant to cutaneous damage from radiation secondary to a prominent blood supply, the hair follicles are more prone to injury. Owing to the high mitotic activity of the rapidly dividing hair matrix cells, an insult of radiation can lead to an abrupt cessation of cell division resulting in a localized anagen effluvium within the radiation field [2]. The health of the hair follicle following radiation exposure is dependent on the number of matrix cells that remain viable. Temporary alopecia occurs at doses greater than 3 Gy, which results in tapering of the hair diameter to the point that it breaks off [3]. If a proportion of the hair matrix cells are still viable, the alopecia is temporary and the hair shaft will eventually return to normal diameter. Hair regrowth after radiation may be different in texture and pigmentation. Hair regrowth is expected within 8-12 weeks, as in our patient [3]. Loss of the hair follicle, and thus irreversible damage, occurs at doses higher than 7 Gy [3].

The lens of the eye is another tissue, which is sensitive to radiation injury. In a study of atomic bomb survivors, the dose threshold for the development of cataracts was shown to be much lower than the usually assumed 2-5 Gy and the data were compatible with no threshold at all [4]. The latent period between exposure and onset appears to be inversely related to dose. Clinical studies on human adults present uncertain data concerning the length of the latency period, with it ranging from 0.5 to 35 years, with an approximate average of two to three years [5]. A study by Klein et al. showed a relationship between diagnostic X-rays of the head and development of posterior-subcapsular cataracts [6]. An increase in cataracts as compared to control groups has been reported in interventional cardiology staff [7]. Overall the literature is lacking in reports of cataract development following interventional and diagnostic procedures involving radiation. Although it cannot be known whether our patient developed a cataract as a result of the radiation exposure, a point of future study may be whether the presence of skin changes such as radiation-induced alopecia following an interventional procedure increases the likelihood of subsequent cataract development.

In conclusion, radiation exposure is associated with many mucocutaneous side effects such as acute radiation dermatitis, chronic radiation damage, anagen effluvium, and scarring alopecia. For dermatologists, prompt recognition of these manifestations of radiation exposure is important for correct diagnosis and management. Radiation exposure has also been associated with ocular side effects such as cataracts. Therefore, screening for cataracts may be beneficial in patients who develop anagen effluvium following an extended fluoroscopic procedure.

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