

## Skin lesions associated with BIS monitoring in pediatric patients undergoing cardiac surgery

Soichiro Yamashita · Taro Mizutani ·  
Takeru Shimizu · Makoto Tanaka

Received: 22 February 2011 / Accepted: 28 February 2011 / Published online: 30 March 2011  
© Japanese Society of Anesthesiologists 2011

To the Editor:

The appearance of skin lesions at the attachment site of the bispectral index (BIS) sensor (Aspect Medical Systems, Newton, MA) was reported in an adult patient undergoing general anesthesia [1]. The Zipprep technology (Aspect Medical Systems; compatible with Ag–AgCl electrodes printed on a polyester substrate with adhesive foam backing) is currently used for BIS sensors. Although skin lesions at the attachment site of the BIS pediatric sensor frequently occur, occasionally remaining for a long time in pediatric patients undergoing general anesthesia, we recently reported blisters, another type of skin lesion, at the site where the adhesive part around the central electrode of the BIS sensor was attached [2]. Because we use BIS monitoring to detect cerebral ischemia in pediatric patients undergoing cardiac surgery [3], we designed a prospective observational study to investigate the incidence of skin lesions associated with use of the BIS sensor in pediatric patients undergoing cardiac surgery at our hospital between February and June 2009. Approval of the Ethics Committee of our hospital was obtained. We defined skin lesions associated with the BIS sensor as punctiform redness with or without tiny bleeding spots corresponding with electrode

tines observed immediately after the removal of the BIS sensor and up to at least 24 h thereafter.

Skin lesions associated with the BIS sensor (Fig. 1) were observed in 11 (median age 7 months old; age range 2–46 months; 3 ventricular septal defect closures, 3 atrio-ventricular septal defect radical operations, 2 bidirectional Glenn procedures, 1 total cavo-pulmonary connection, 1 Rastelli operation, 1 modified Blalock–Taussig operation) of 15 pediatric patients undergoing cardiac surgery while BIS monitoring was used. In contrast, no skin lesions were observed in 787 adult patients in whom BIS monitoring was used during the same period. Skin lesions healed within 3 days in five of the pediatric patients and within 7 days in three patients post-surgery, but lasted for about 10 days post-surgery in three very young pediatric patients: a 2-month-old infant (height



**Fig. 1** Skin lesions at the site of the bispectral index sensor on the forehead of a 3-month-old pediatric patient undergoing ventricular septal defect surgery

S. Yamashita (✉) · T. Shimizu · M. Tanaka  
Department of Anesthesiology and Critical Care Medicine,  
Institute of Clinical Medicine, Graduate School of  
Comprehensive Human Sciences, University of Tsukuba,  
1-1-1 Tennodai, Tsukuba, Ibaraki 305-8575, Japan  
e-mail: soichi2003@aol.com

T. Mizutani  
Department of Emergency and Critical Care Medicine,  
Institute of Clinical Medicine,  
Graduate School of Comprehensive Human Sciences,  
University of Tsukuba, Tsukuba, Japan

54 cm, weight 4.3 kg), a 2-month-old infant (height 55 cm, weight 4.6 kg) and a 3-month-old infant (height 60 cm, weight 4.0 kg).

In all cases, the skin lesions healed without any sign of infection and scar formation. However, because parents may be concerned about these lesions on the forehead, anesthesiologists should be aware that such skin lesions may appear in association with electrodes using Zipprep technology in pediatric patients and assure parents that they are in all likelihood benign and without clinical importance.

**Conflict of interest** The authors certify that there is no actual or potential conflict of interest in relation with this article.

## References

1. Hemmerling TM. BIS sensor electrodes can cause skin lesions: case report. *Anesth Analg.* 2004;98:1811–2.
2. Yamashita S, Mizutani T, Shimizu T, Sakakura Y, Tanaka M. BIS pediatric sensor can cause blisters in small children. *J Anesth.* 2010;24:978–9.
3. Hayashida M, Kin N, Tomioka T, Orii R, Sekiyama H, Usui H, Chinzei M, Hanaoka K. Cerebral ischaemia during cardiac surgery in children detected by combined monitoring of BIS and near-infrared spectroscopy. *Br J Anaesth.* 2004;92:662–9.