Low level laser therapy: a promising adjunct therapeutic modality for pain control after coronary artery bypass graft surgery

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Coronary artery bypass graft (CABG) surgery is one of the most commonly performed cardiac surgeries worldwide [1]. Despite developing new standards and advances in postoperative pain management, many patients experience considerable pain following CABG and postoperative pain continued to be undertreated in these patients [2,3].

Inadequate pain control after CABG can result in increased risk of postoperative morbidities such as pulmonary complications, psychological problems, higher myocardial oxygen consumption, ischemic events, and arrhythmia, as well as increased patients’ length of hospital stay and decrease their overall satisfaction. Moreover, it can potenti ally trigger development of postoperative chronic pain [4]. Therefore, appropriate postoperative pain management after cardiac surgery is crucial, and using a multimodal approach, including the combination of multiple techniques such as pharmacologic and non-pharmacologic interventions for pain control, has been considered a preferred strategy [4,5].

Recently, low level laser therapy (LLLT) has been suggested as a non-pharmacological adjunct therapy to the modalities that are currently available for pain management after CABG surgery. Although the efficacy of LLLT, as a fast-growing technology for chronic pain management, has been relatively well known, using it for acute postoperative pain management is relatively new and still developing [6].

The results of a study by Fernandes et al. [7] showed the efficacy of LLLT (wavelength=660 nm) in reducing the acute postoperative pain of sternotomy after CABG surgery. In this study, patients’ mean visual analogue scale (VAS) scores reduced from 6, in the second day, to 1.5 in the eighth day after surgery.

Another study by Lima et al. [8] revealed the positive analgesic effect of LLLT (wavelength=640 nm) in hyperglycemic and normoglycemic patients who underwent CABG surgery (patients’ mean VAS scores decreased significantly from 6 to 2 in the second and eighth day after surgery, respectively).

In these two studies, patients received LLLT immediately after surgery and on subsequent days 2, 4, 6, and 8, postoperatively. A study by Karkkäri et al. [9] found that laser therapy (wavelength=980 nm) in the postoperative period is an effective technique for postoperative analgesia...
following off-pump CABG surgery. In this study, the patients’ mean VAS score decreased from 7.3, before application of the laser, to 4 and 3.4 at 1 and 24 hours after laser therapy, respectively.

Although the precise mechanisms of LLLT are still unclear, promoting the release of endorphins and serotonin, promoting vasodilatation, improving the local circulation, as well as the anti-inflammatory effect of LLLT have been suggested as probable analgesic mechanisms [7,8,10]. In terms of safety, none of the abovementioned studies have reported any side effect related to application of LLLT in patients who underwent CABG surgery. Moreover, it has been revealed that using LLLT in the postoperative period after CABG can decrease patients’ myocardial damage and promote their cardiac tissue regeneration and repair [11].

In conclusion, it seems that LLLT can be used as a non-invasive, easily applied, effective, and safe adjunct therapeutic modality for postoperative pain control after CABG surgery. However, further well-design studies are warranted to determine and confirm the potential clinical value of LLLT for postoperative pain management after CABG surgery, as well as its optimal choice of parameters such as power density, wavelength, pulse structure, and influence/timing of the irradiation, which can influence the effectiveness of this therapeutic modality.

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