

## A sports headlight retrofitted on magnifying loupes: A simple and cheap method for daily use

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Medical professionals such as doctors, nurses and paramedics often use headlight to examine or to perform surgical intervention in the patients. However, there are concerns related to its use such as comfort for the user, mobility and asepsis for the cable, availability in the departments plus cost effectiveness. The concept of a retrofitted 1-watt sports headlight (adjusted on magnifying loupes) would give quick access to a light source, be available and reliable at any place, save vital funds and would be environmentally friendly as the battery can be replaced. The same concept can be applied to pre-hospital emergency care and disaster medicine as well.

**Background:** Headlights with fibre optic cables have been used for two decades as an adjunct to the operating theatre lighting. The cable-powered headlights pose, to our experience, some limitations for the operating team: Smooth personnel circulation around the operating field is hindered by repeated unplugging and re-plugging of the cable when surgeon and assistants change sides. Protocols for draping and asepsis have to accommodate the cumbersome cable and the light source and in addition are time consuming and arising issues of flexibility. The weight of the headlight and cable may cause health issues for the bearer (head ache, low back pain) [1]. Portable surgical headlights have also been available for the last decade for a not negligible cost. They are powered by a battery pack, attached to the torso/waist and connected to the headlight by a shorter cable. They are priced at hundreds of pounds.

**Method:** As an alternative to cumbersome cables and expensive 'ad hoc' designs, we use a retrofitted 1-watt sports headlight with a weight of 100 grams. We acquired that for \$ 14.99 (approximately £10) from an outdoor specialist retailer (Petzl America, Clearfield, Utah, USA). The headlight is powered by three 1.5 Volt AAA batteries and provides 60 lumen of luminous flux (Fig.1). We have wrapped the elastic bands of the headlight around the corresponding horizontal (axial circumferential) and sagittal elements of the headband, where the magnifying loupes are mounted (Keeler Ltd., Clewer Hill Road, Windsor SL4 4AA). The headlight can be aimed by tilting the housing (Fig.1, 2).

**Discussion:** The luminous flux from our headlight according to our experience in cardiothoracic surgery is adequate for a variety of procedures: femoral and axillary arterial access, harvesting internal thoracic (mammary) arteries, open pulmonary resections, valve surgery. Being fully portable without cable, light source or pouches, it is especially handy outside the operating suite (ITU, A&E, wards) for emergency re-explorations for bleeding, secondary wound closures, application of vacuum therapy dressings, trauma, for ECMO work etc. Finally, we have had no evidence of thermal injury, as has been reported from strong xenon beams [2]. This simple affordable headlight system can be easily adapted to the needs of the entire spectrum of surgical specialties, especially those using magnifying loupes. Therefore, can be part of basic life support kits for use in pre-hospital emergency care, disaster and military medicine [3].

The device has the following advantages:

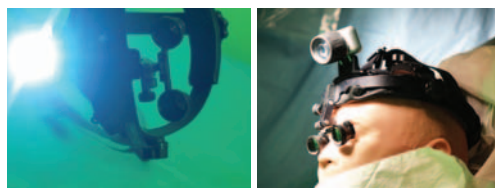
1. "Two-in-one" function of Loupes and Torch.
2. Battery can be changed (so no need to throw away the item) and is environmentally Friendly
3. No need for asepsis
4. Cost effective
5. Availability every where

In conclusion, we believe this is a practical medical device.

Figure legends:

Fig 1. Frontal view, the headlight attached to the headband / loupes unit as described.

Fig 2. Left side view, the system mounted on the head of a mannequin.



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