

ROLE OF GOOGLE-CARDBOARD DURING SURGERYElankumar S¹, Chittoria R K^{2*}**Abstract**

Most of the plastic surgical procedures can be done under local anesthesia or under regional block where most of the time patient will be conscious and oriented. Even whatever reassurance given by the caring staff patient remains in apprehension and anxiety. Even though sedation may be an option where anaesthesia team is available, this facility may not be available always. In these conditions to divert patient's apprehension, anxiety and increase cooperation lot of measures have been described like music therapy, hypnosis etc. Another method which could be tried is not only audio (music) but also combined with video (audio-video) to distract patient's attention from surgical procedure. This also has been attempted by asking patient to look at the monitor but may be cumbersome for patient to constantly look at particular direction and may be disturbing for the operating team. To resolve these issues, this study highlights the application of Google Card Board.

Author Affiliations:

^{1&2} Department of Plastic Surgery, Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Pondicherry-605006

Keywords: Google cardboard, Anxiety, Distraction, Intraoperative cooperation

***Corresponding Author:**

Dr Ravi Kumar Chittoria, MS, MCh, DNB, MNAMS, PhD, MBA, PDCR, PGDTM, PGDMLS

Professor & Registrar (Academic), Department of Plastic Surgery

Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER)

Pondicherry-605006. Email: drchittoria@yahoo.com

INTRODUCTION

Technology has developed immensely in the past two decades. It is hard to see a person without smart gadgets (smartphones, tablets etc). The era of watching movies only in theatres and televisions has gone. Moreover there are portable, cheap gadgets available in the market which can give three dimensional imaging/video streaming when they are attached with the smartphones. Google cardboard is one such device (figure 1). Google cardboard is a technology developed by Google which utilizes virtual reality platform, consists of a head mount with a slot for smart phone. The platform was first made by David Coz and Damien Henry, Google engineers at the Google Cultural Institute in Paris. The platform is a low cost system which consists of fold-out card board viewer. Cardboard viewer is made up of folded card board a pair of lens. It has a head band for fixing the system to the head. Users can make their own design by using easily available contents. List of parts, schematics, and assembly instructions are freely available on their website. Pre manufactured viewer is also available in a ready to use device. The smart phone is kept in the slot provided in the back of the box and pictures/videos are seen from the front through the lenses. The google cardboard can be used during surgery by

making the patient wear it and playing video of his/her choice, so that the patient is distracted during surgery and their apprehension and anxiety is reduced and cooperation is increased.^[1,2]

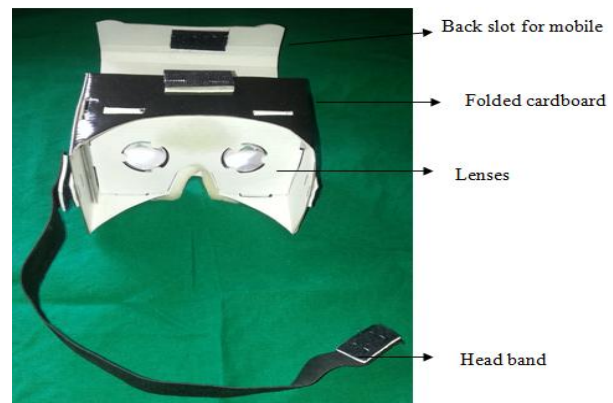


Figure 1: Google Card Board

MATERIALS AND METHODS

The study was conducted on 6 patients admitted in the JIPMER plastic surgery department during the period of January 2017 to March 2017. Five males and one female were included in the study. The mean age of the study population was 35 years (ranging from 21 to 52 years). The inclusion criteria included age more than 18 years, patient fit for regional anesthesia and agreeing with consent for use of Google Card Board. The patients with altered mental status were excluded. The application of google cardboard was explained to the patient before the procedure and the video to be played was chosen according to the patient's wish (figure 2).

The procedures were conducted in the operation theatre and the video along with the music was played in a smartphone attached to the google card board with headphone worn by the patient. The average procedure time was 74 minutes. The parameters assessed were pulse rate, blood pressure before, self-report scales for pain (numeric pain rating scale, NRS-11) and Hospital Anxiety And Depression Scale (HADS).^[3] The study was conducted on a descriptive basis and only descriptive analysis was done. The procedures performed included reconstructive surgeries for upper limb trauma. Anaesthetic formulations without adrenaline were used to avoid rise in pulse and blood pressure which are some of the parameters under study. All the parameters like pulse, blood pressure, pain rating scale were recorded before, during and after the procedure except Hospital Anxiety & Depression Scale (HADS) which was recorded before and during surgery (table 1).



Figure 2: Patient using Google Card Board during surgery

RESULTS

With the application of google cardboard all the parameters improved or remained same. The details of the patients' parameters are shown in Table -1. The most important parameter was level of anxiety and depression which remained same or reduced leading to good cooperation of the patient during surgery.

DISCUSSION

The viewer uses a Cardboard-compatible app which splits the smart phone display image into two, one for each eye. A stereoscopic 3 dimensional image is obtained by applying barrel distortion to each image to counter pincushion distortion from the lenses.

Three software development kits are available on Google for developing Cardboard applications. One for the Android operating system using Java, other for the game engine Unity using C#, and another one for the iOS operating system. Smart phone with screen size up to 6 inches can be used to see 3 D images in the viewer box. There are many articles describing responses to non-pharmacologic methods of pain, anxiety and apprehension management. These include complete information giving, cognitive methods for explaining precisely what is

going to happen to the patient, relaxation training, distraction and guided imagery, humor, hypnosis, biofeedback, and music.^[4-8] In this study video with audio (music) was tested. It is hypothesized that due to addition of video component to audio (music) there is

higher possibility of improvement in perception to pain, anxiety & better cooperation, though large randomized controlled study is required to validate this study.

Table-1 Showing patients' details and study parameters

S.No.	Age (years) / gender	Pulse rate			Mean blood pressure (mm Hg)			Numeric pain rating scale (NRS-11)			Hospital Anxiety and Depression Scale (HADS)	
		Pre op	Intra op	Post op	Pre op	Intra op	Post op	Pre op	Intra op	Post op	Pre Op	Intra Op
Patient 1	36/male	86	84	84	90	90	90	6	5	4	6	5
Patient 2	21/male	78	76	76	84	82	82	6	5	5	7	7
Patient 3	32/female	88	86	86	90	88	86	5	4	4	6	5
Patient 4	52/male	79	78	78	94	92	90	5	4	4	5	4
Patient 5	24/male	80	79	78	74	72	70	6	5	4	6	5
Patient 6	44/male	76	74	72	88	88	88	6	5	4	5	5

CONCLUSION

Google cardboard application has benefits with respect to improvement in anxiety, apprehension, pain perception leading to better cooperation from patient during surgery. A large multicenter randomized

control study may be required for validating the same.

Conflict of Interest Statement- NIL

REFERENCES:

1. Miller AC, Hickman LC, Lemasters GL. A distraction technique for control of burn pain. *J Burn Care Rehabil* 1992; 13:576 – 80.
2. Robb S, Nichols R, Rutan R, Bishop B, Parker J. The effects of music assisted relaxation in preoperative anxiety. *J Music Ther* 1995;32:2–21.
3. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale: an updated literature review. *Journal of psychosomatic research*. 2002 Feb 28;52(2):69-77.
4. Faymonville ME, Fissette J, Mambourg PH, Roediger L, Joris J, Lamy M. Hypnosis as adjunct therapy in conscious sedation for plastic surgery. *Regional Anesthesia and Pain Medicine*. 1995 Mar 1;20(2): 145-51.
5. Hoffman HG, Doctor JN, Patterson DR, Carrougher GJ, Furness III TA. Virtual reality as an adjunctive pain control during burn wound care in adolescent patients. *Pain*. 2000 Mar 1;85(1):305-9.
6. Hoffman HG, Richards TL, Coda B, Bills AR, Blough D, Richards AL, Sharar SR. Modulation of thermal pain-related brain activity with virtual reality: evidence from fMRI. *Neuroreport*. 2004 Jun 7;15(8):1245-8.
7. Gershon J, Zimand E, Pickering M, Rothbaum BO, Hodges L. A pilot and feasibility study of virtual reality as a distraction for children with cancer. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2004 Oct 31;43(10):1243-9.
8. Sharar SR, Carrougher GJ, Nakamura D, Hoffman HG, Blough DK, Patterson DR. Factors influencing the efficacy of virtual reality distraction analgesia during postburn physical therapy: preliminary results from 3 ongoing studies. *Archives of physical medicine and rehabilitation*. 2007 Dec 31;88 (12): S43-9.