

Use of harmonic focus shears in plastic surgery: Literature review and future recommendations

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Introduction

Harmonic Focus Shears (HFS) (Ethicon Endo-Surgery, Inc., Blue Ash, Cincinnati, OH, USA) is an ultrasonic device specifically designed through its curved clips and hand activated trigger system to be precise and minimise the impact on tissues. It utilises defined energy of high frequency vibrations to deliver cutting and coagulation, at the same time limiting lateral thermal spread and therefore protecting critical structures (1). Initially designed for head and neck dissection and proved to be effective without increasing risk of complications in thyroidectomy procedure (2) it is surprisingly rarely mentioned in the field of plastic surgery.

Although not widely used there is evidence to suggest use of older, classic ultrasonic devices can be beneficial in plastic surgical procedures. We performed a literature search therefore to established current uses of ultrasonic devices in plastic surgery and determine its effectiveness, and future uses.

Methods

Literature search was performed in accordance to guidelines for Preferred Reporting Items for Systemic Reviews and Metanalysis (3). PubMed, Ovid-Embase and Medline database search comprised terms "harmonic focus shears* or harmonic focus*, or ultrasonic device*, or ultrasonic scalpel*, or ultrasonic blade*, and plastic surgery*. 172 articles were identified. Duplicate articles were removed and search narrowed to concentrate on use of ultrasonic devices in plastic surgery, specifically HFS.

Discussion

Use of ultrasonic devices as harmonic prove to be a useful tool in precise large tissue dissection surgery including pedicled flap (4, 5) and free flap (6, 7) dissection. Described benefits embrace upgraded operative time, blood loss, tissue discharge and morbidity.

Initially described to be superior to traditional electrocautery in facelift procedure (8, 9), ultrasonic devices then evolved to be advantageous when considering outcomes in breast reduction surgery (10), implant based breast reconstruction (11) and capsulectomy (12).

HFS as a novel and improved ultrasonic device allows for focused forceps dissection, haemostasis and tissue coagulation without the need to swap instruments that is safe to the surrounding tissues. Learning curve is expected and pitfalls include additional staff training, multiple wire device setup, single use and possible overheating. On balance however improved timings and therefore operative efficiency, low risks of complications and optimal patient outcomes make this method of tissue handling a favourable tool to introduce to common plastic surgical practice. In our trust HFS has been extensively used with success for breast reduction surgery, abdominoplasty, hidradenitis suppurativa excision, axillary and groin dissection and sentinel node biopsy, and therefore we would argue these procedures to be suggestions for future applications.

1. Market share data compiled from Decision Resources Group EOS # 120150-190806. <https://www.injmedicaldevices.com/en-US/product/harmonic-focus-shears-ethicon>

2. Cheng H et al., Hospital costs associated with thyroidectomy performed with a Harmonic device compared to conventional techniques: a systematic review and meta-analysis. *J Med Econ.* 2016 Apr 5:1-9. [Epub ahead of print] (051511-160418)

3. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Moher D, Liberati A, Tetzlaff J, Altman DG; PRISMA Group. *BMJ.* 2009 Jul 21;339:b2535. doi: 10.1136/bmj.b2535.PMID: 19622551

4. Deo S, Hazarika S, Shukla NK, Kar M, Samaiya A. A prospective randomized trial comparing Harmonic scalpel versus electrocautery for pectoralis major myocutaneous flap dissection. *Plast Reconstr Surg.* 2005;115:1006-1009.

5. Preventive effects on seroma formation with use of the harmonic focus shears after breast reconstruction with the latissimus dorsi flap. Sowa Y, Numajiri T, Kawarazaki A, Sakaguchi K, Taguchi T, Nishino K. *J Plast Surg Hand Surg.* 2016 Dec;50(6):349-353. doi: 10.1080/2000656X.2016.1178129. Epub 2016 May 5.PMID: 27146859