

Lightness of touch

Abstract

Photographs advertising basic surgical skill course were examined for correctness of forceps handling. Up to 74.5% of the photos showed suboptimal and even aberrant instrument handling.

Keywords: Lightness of touch, instrument handling, functional anatomy of the hand.

Volume 11 Issue 3 - 2023

David O'Regan

Visiting Professor, Department of Surgery, Imperial College, London

Correspondence: David O'Regan, MBA MD BM FRCSEd (C-Th) FFSTEd, Visiting Professor, Department of Surgery, Imperial College, London, St Mary's Hospital, Praed Street, London W2 1NY, Email d.oregan@imperial.ac.uk

Received: September 25, 2023 | **Published:** October 13, 2023

Highlights

Adverts for basic surgical skills training demonstrate incorrect handling of forceps.

The pinch pressure of the average male is 30 N and female is 25 N

The pulps of the fingers should be in contact with the instrument to improve the feel.

Competencies

1. Practice -Based learning and Improvement
2. Systems-Based Practice
3. Medical Knowledge

Introduction

Surgeons need to be able to caress the tissue with the lightest of touches and not merely be hewers of flesh.

Lod Berkey Moynihan

We run many basic surgical skills courses, but often little focus is given on how to hold surgical instruments. Injudicious use of the surgical forceps can damage tissue. The learning to use forceps needs to include an explanation on how to hold the forceps to avoid pinching and improving feel. Personal observation over the years has identified that many basic surgical skills courses are conducted sitting down (O'Regan – in press). Consideration needs to be given to the functional anatomy of the upper limb and the best position to make the best use of the intrinsic muscles of the hand. Furthermore, the forceps needs to be interdependent of the dominant hand. The benefits are clear. Lightness of touch and respect the tissues.

Method

Following a casual observation, social media (Twitter and Instagram) was prospectively scanned twice a week over the period of four months from 01/11/2022 to 27/02/23. All new surgical organisations were saved for future searches. Screenshots were taken on an iPhone 12Pro of all basic surgical skill adverts and courses that involved stitching. Each photo was examined to determine the use of forceps. The posture of the hand, the grip, and the flexion of the interphalangeal joints, especially the index finger was noted. Either hand was counted as in all the photographs the forceps were employed in the act of stitching.

Extension of the interphalangeal joints of both the index finger and thumb with 'cradling' of the forceps in the first web space and application of the pulps of the fingers was considered a good hold (Figure 1). The position of the hand was noted overhand or an underhand 'salad server' hold (Figure 2A.) A displacement was counted if the forceps were held outside the 'cradle' of the first web space including the lateral aspect of the first phalanx of the index finger (Figure 2B). The flexion of the proximal interphalangeal joint of the index finger was noted as well as the application of multiple fingers. Flexion of the distal interphalangeal joints of the index finger and thumb was deemed a pinch.



Figure 1 Extension of the interphalangeal joints of both the index finger and thumb with 'cradling' of the forceps in the first web space and application of the pulps of the fingers was considered a good hold.

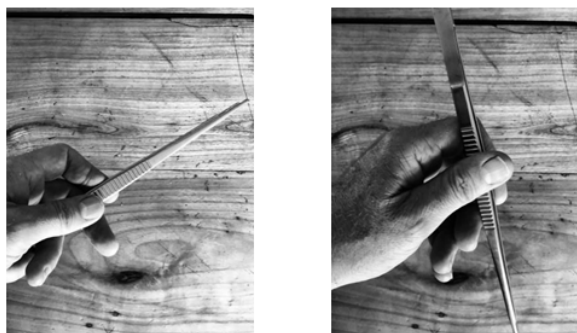


Figure 2 A is the underhand 'salad serve drip' and B is considered the displaced grip.



Figure 3 Extension of the DIP joints increases surface area of the pulps of the fingers applied to the forceps.

Results

A total of 109 photographs were saved over this four-month period. Some of the adverts were historical (20/109) dating from 06/07/2013 to 18/11/2020. Twitter accounted for 48/109 and Instagram 61/109. Fifteen countries are represented in these adverts with the majority (76/109) in England and 88/109 in the United Kingdom and Ireland.

50/109 photographs included 71 forceps. The table summarises the obser

	Body	Visible forceps	Good	% good	Multiple fingers	Index proximal IP flexion	DIP flexion (pinch)	% pinch	Displaced	Overhand	Salad server
College	1	4	3	75	1	0	0	0	0	0	0
Professional	7	9	4	44.4	0	3	2	22.2	0	0	
Surgical society	9	11	4	36.4	0	2	1	9.1	2	2	0
Student body	33	47	12	25.5	4	10	2	4.3	6	4	9
Total	50	71	23	32.4	5	15	5	7	8	6	9

A good hold was less prevalent, and displacement of the forceps or aberrant hold was more prevalent in student advertised courses. Flexion of the proximal interphalangeal joint and pinching was present across the organising bodies except the college.

Discussion

It is assumed that the use of the forceps was in the non-dominant hand as in all the photographs the delegates other hand was employed using a needle holder. The teacher and the learner often focus on the action of stitching and forget the forceps. The synergy and interdependence of hand movement is critical especially in surgery.¹ Personal observation and teaching basic skills over twenty-three years has identified the ability to stitch deteriorates when the forceps are introduced in the learning process. Common errors of forceps use are pinching, drifting, and dragging the tissues.

It is difficult to ascertain the level of expert supervision any of these courses although it appears that poor grip was noted more frequently when the course was run by a student body – 74.5% vs 55.6%. The frequency of an 'aberrant hold' was higher in the student and surgical society courses. Better handling is seen in the courses run by professional bodies and the college. This may be because the delegates are more senior, or the level of supervision was more expert or assiduous. Either way, the basics of instrument handling does not appear to be reinforced. The explanation and teaching of lightness of touch appears to be absent.

A good and light hold is achieved by the application of the pulps of the finger and thumb to the body of the forceps. Opponens pollicis² enables maximal pulp to pulp surface area of the thumb and fingers

(Figure 2A).³ This in turn affords maximum sensory perception of the fingers.⁴ The lumbricals flex the carpal phalangeal joints and extend the interphalangeal joints of the fingers. Since these are the only muscles in the body without a bony origin or insertion, the application of force is limited. Flexion of the proximal interphalangeal joint (15/71) involves the long flexors of the forearm and thereby increases the force. Pinching is achieved by flexing the distal interphalangeal joints of the index finger and thumb and often evident by the blanching of the fingernail beds (this is evident through a surgical glove). The flexor digitorum profundus and flexor pollicis longus, in the deep flexor compartment, are the two biggest muscles of the forearm. These 'Popeye' muscles are crucial to the survival of wall and cliff climbers. The pinch force, generated by these long flexors as they flex the distal interphalangeal joints is between 25 N and 50 N.⁵ (If the surface area of the end of a pair of forceps is assumed to be 5 mm² (5 x 10⁻⁶ m²), the pressure exerted on tissue by pinching the forceps is more than 5 million Nm² (Pressure = Force (N) / Area (m²) or the equivalent of 725 psi. Tissue damage is inevitable (Figure 2B).

Correct posture with the shoulders down, elbows by the side, elbows slightly extended and hands palmar flexed neutralises the action of the major muscle of the upper limb isolating the action of the intrinsic muscle of the hand. The finger flexors of the forearm need some wrist extension to function properly. As previously published all the delegates in these photographs were sitting and wrist extension is inevitable.

Multiple fingers appeared to be applied to the forceps in five cases, but these were extended and may be the natural position of the persons' hand. It was, however, more frequent in the student organised courses. More fingers means a potential for more pressure.

This was not a rigorous systematic search but an observation that we are not reinforcing instrument handling and technique surgical skills courses. There is a paucity in the literature about the conduct of basic surgical skills training in reference to set up, posture and arm position and less than a quarter of surgeons have had education in ergonomics.⁶

This study looked at forceps handling on basic surgical skills courses - 50/109. It was not possible to determine the level of supervision that was afforded. Although peer to peer training is useful, it is important that the exercises are properly supervised.⁷

Correct handling is the primary focus of coaches teaching baseball, cricket, or golf. It is noted that learner is advised to maintain a light grip and the position of the hands and the placement across the hands is paramount to achieve the desired function. Taking baseball for example, we do not appear to address the teaching of surgical skills with the same attention to detail.⁸

Acknowledgments

None.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Chen B, Aruin AS. Does the type of somatosensory information from the contralateral finger touch affect grip force control while lifting an object? *Neuroscience letters*. 2013;556:196–199.
2. Karakostis FA, Haeufle D, Anastopoulou I, et al. Biomechanics of the human thumb and the evolution of dexterity. *Current biology*. 2021;31(6):1317–1325.e1318.
3. Luukinen P, Leppänen OV, Jokihaara J. The effect of digital sensory loss on hand dexterity. *The Journal of hand surgery*. 2021;46(3):253–259.
4. Arbuckle SA, Pruszynski JA, Diedrichsen J. Mapping the integration of sensory information across fingers in human sensorimotor cortex. *J Neurosci*. 2022;42(26):5173–5185.
5. Valerio T, de Monsabert BG, Faudot B, et al. The effect of index finger distal interphalangeal joint arthrodesis on muscle forces and adjacent joint contact pressures. *Med Biol Eng Comput*. 2022;60(9):2537–2547.
6. Aaron KA, Vaughan J, Gupta R, et al. The risk of ergonomic injury across surgical specialties. *PloS one*. 2021;16(2):e0244868.
7. Higgins M, Madan RC, Patel R. Deliberate practice in simulation-based surgical skills training: a scoping review. *J Surg Educ*. 2021;78(4):1328–1339.
8. Baumer B, Zimbalist AS. The sabermetric revolution: assessing the growth of analytics in baseball. Philadelphia, Pennsylvania: University of Pennsylvania Press. 2014.