JPRAS Open 28 (2021) 97–102

Contents lists available at ScienceDirect

JPRAS Open

journal homepage: www.elsevier.com/locate/jpra

Original Article

Digital art - a useful tool for medical professionals to create medical illustrations ☆

Aswin Appukuttan

St Andrew's Centre for Plastic surgery and Burns, Broomfield Hospital, Mid and South Essex Hospitals NHS Trust, Chelmsford, Essex, CM1 7ET United Kingdom

ARTICLE INFO

Article history:
Received 17 February 2021
Accepted 26 February 2021
Available online 11 March 2021

Keywords:
Digital art
Medical illustration
Medical drawing
Digital illustration
Surgical illustration

ABSTRACT

Illustrations are routinely used in medicine for teaching, communication, record keeping, research and publication purposes. Many medical professionals including the author prefer to create their own medical illustrations for use in presentations and publications. With the advent of digital media, it has become easier to create good quality illustrations even for those with limited artistic skills including the author. This article describes the author's experience with creating medical illustrations using digital media and discusses the benefits of the new technology. A few useful tips are also provided for medical professionals who would be interested in exploring the option of creating their own illustrations using digital tools.

Introduction

Medical illustrations are commonly used in textbooks and journals and increase the readability, comprehensibility, and appeal of the work. Many medical professionals prefer to create their own illustrations for publication and teaching purposes as this helps direct, accurate conception of the creator's ideas and saves cost. With the widespread availability of digital equipment, there has been

☆ Presentation at meetings: None.

E-mail address: draswin@hotmail.com

https://doi.org/10.1016/j.jpra.2021.02.008

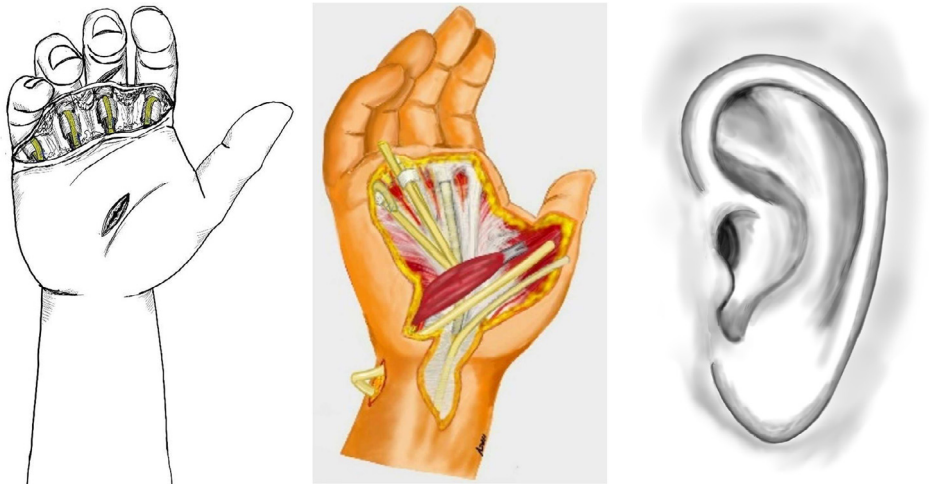

Fig. 1. Sample digital illustrations created by the author using digital pen and tablet computer.

an increased use of technology for art in general and the same applies to medical illustrations. The author has found digital drawing tools to be a very useful adjunct for creating simple medical illustrations and anatomical drawings. This article describes the author's experience with digital medical art creation and attempts to create awareness and provide useful tips for medical professionals who may be interested in creating their own illustrations in digital format.

Methods/ author's experience

The author's initial work with medical illustrations involved traditional media (pen/pencil, paper, various colouring media). These have, in the hands of the amateur artist (the author) provided reasonable results in the author's opinion. However, there was a desire for further refinement especially with the advent of digital publications. The author's initial attempts with digital media involved scanning and digitization of paper drawings. Attempts to draw using a mouse device on a computer lacked dexterity. The earlier digital tablets with pen functionality were limited by the poor processing power and lack of fluency and precision of the pen tools. The availability of powerful computers at lower cost with added touch and pen functionality increased the potential usefulness of these devices. The option of a detachable keyboard or a tablet computer provided ease of drawing and a more natural sketching feel. The author currently uses a tablet computer (Microsoft Surface Pro®, USA), a digital pressure sensitive pen (Microsoft Surface®, USA) and an easily affordable dedicated illustration software with adequate tool options and has found these sufficient for routine illustration purposes (Fig. 1). Several other devices and software applications are commercially available with varying costs and features to suite each illustrator's requirements.

Discussion

It is said that a picture is worth a thousand words. The use of art in medicine is frequent in teaching, learning, interactions, clinical consultations, record keeping and publishing. Medical illustration has emerged as a dedicated profession with professional medical illustrators available to do the work, but at a cost. Various stock images are also available to purchase but may not always meet the specific requirement. Many medical professionals have taken the challenge of creating their own illustrations and this practice is quite common amongst surgeons.[1] There are many publications on medical art creation techniques by professional illustrators[2,3] but not many by medical professionals. The avail-

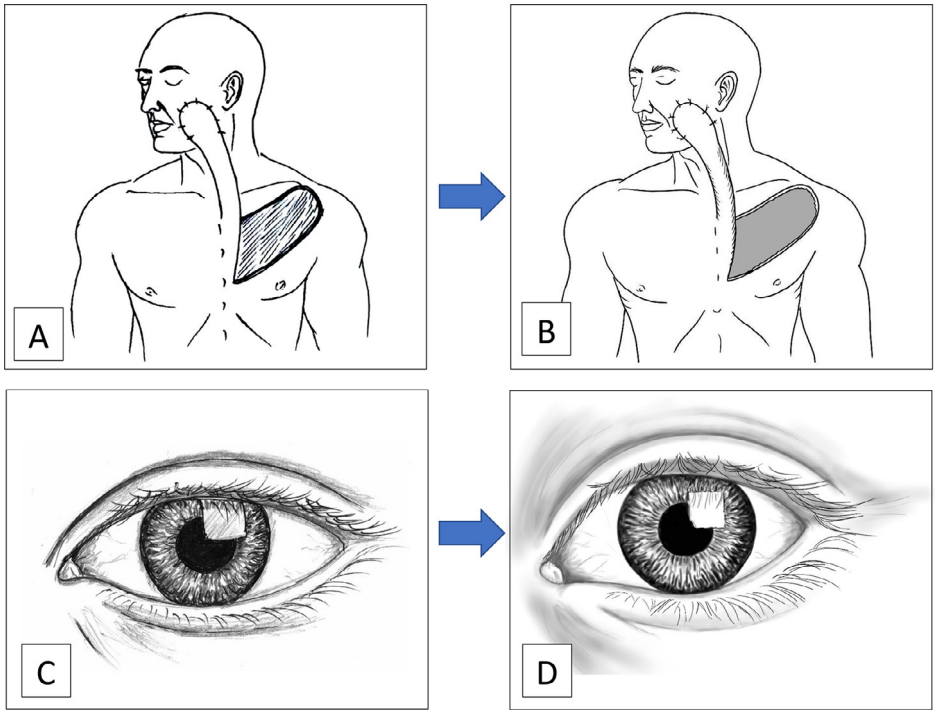

Fig. 2. Comparison of pen and paper illustrations to digital hand drawn illustrations. (A, C) Pen and paper illustrations scanned and edited to improve quality. (B, D) Corresponding digital hand drawn illustrations.

able literature includes methods of converting digital images to line art using photo editing software[4] and digitization of hand drawings.[5]

The emergence of digital art has created opportunities for both the professional as well as the untrained illustrator. Venturing into digital art creation is possible using affordable digital equipment with addition of a few accessories. The presence of a baseline artistic skill maybe beneficial, though not mandatory. Various tools available in the software applications can help improve the quality of the work. The author has found the use of digital media to be quicker than using traditional media to produce good quality results. The ability to determine the required final resolution and the direct digital output format saves time and effort. In view of these benefits, the author now exclusively relies on digital hand drawings for illustration purposes. However, traditional art has its special place and feel, and the author continues to enjoy the use of the pen, brush, paper and paint for routine non-medical artwork. The author's experience over the years in creating digital illustrations is described below:

1. *Scanning and editing a 'paper sketch':*

This is the simplest method to convert a paper illustration to digital format. However, these creations are restricted by the quality of the paper drawings which is limited when artistic skill is low and professional tools are not used. Errors in the initial drawing could necessitate redrawing on a fresh sheet of paper thus consuming time. Also, repeated corrections can affect the quality of the final image. Various image editing software applications are available which can improve the scanned image quality.

2. *Conversion of scanned paper images to digital vectors:*

The author has in the past used vector illustration software (Adobe illustrator®) to convert scanned paper drawings to digital vectors which can then be manipulated like a pure digital illustration. These

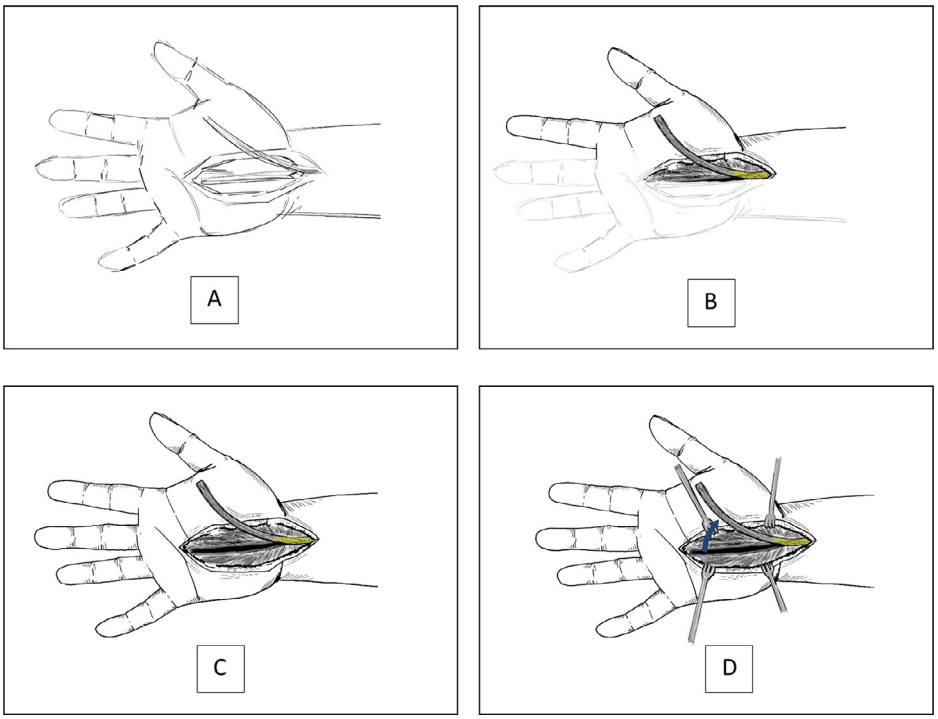

Fig. 3. Use of layering as a template. (A) Rough digital sketch used as template layer. (B) Using the base template layer with reduced opacity. (C, D) Addition of further details to drawing.

applications permit smoothening, stretching, enlarging, reducing, changing stroke thickness and deletion of unwanted strokes as well as colouring. This is different from a normal scanned image as the lines are converted to digital vectors automatically. However, the author has found this technique to be time consuming and requires expensive software and significant computer processing power.

3. *Computer aided drawings:*

Various image editing applications have the option of creating simple drawings with line and shape tools. In addition, Computer-Aided Design (CAD) applications are available commercially. However, from the author's experience, use of CAD is time consuming and difficult without training. The applications are also expensive to own and require devices with high graphic processing power.

4. *Hand illustrations using a digital pen and tablet:*

This involves direct drawing onto a screen using a digital pen and a compatible computer, usually a tablet computer. This option obviates the need for scanning a paper image and instead directly creates the image in digital format. The use of a digital pen tool gives a natural drawing feel and excellent hand control. A pressure sensitive pen is useful to create lines with varying weight (thickness) and taper. Various pen and brush tools in the applications can be used with the digital pen just as with the traditional media but can give more refined results (Fig. 2). A selection of pen and brush options, smooth line and curve tools, uniform colour fills and the ability to undo and correct errors are invaluable in getting the optimum result. The option to use layers to sequentially improve the results and to use template layers as a guide with reduced opacity help improve the final image (Fig. 3). It is useful to start with a rough hand drawn digital sketch on a base layer and to use this as a template to build towards the final sketch (Fig. 4). If colouring using a brush tool, it is better to colour on a layer behind the sketch layer. This avoids painting over the outlines.

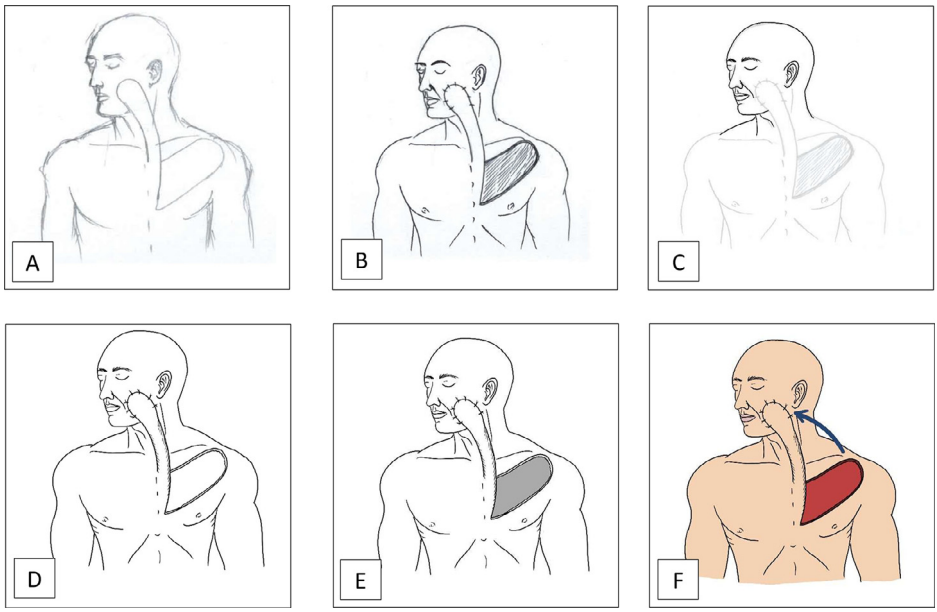

Fig. 4. Progression from a rough hand drawn illustration to final digital drawing. (A) Rough paper sketch. (B) Scanned image of paper sketch for use as template. (C) Using the template sketch with reduced opacity. (D) Digital drawing created using digital pen. (E) Finished digital illustration in grey scale. (F) Finished digital illustration in colour.

The use of a dedicated illustration software application gives additional options and tools and better results compared to basic image editing software and is worth the extra cost, with many affordable options available.

Conclusion

The author has found digital media to be a very useful tool for creating good quality medical illustrations useful for publications and presentations. Various methods are available ranging from scanning of paper drawings to direct illustration using digital tools. A baseline artistic skill is beneficial, but not essential. The use of available tools and techniques in the software applications can help even the less skilled artist create satisfactory results with less effort and in less time.

Declaration of Competing Interest

None.

Funding

None.

Ethical approval

N/A

References

1. Kearns C. Is drawing a valuable skill in surgical practice? 100 surgeons weigh in. *J Vis Commun Med*. 2019 Jan;42(1):4–14.

2. Patel SK, Couldwell WT, Liu JK. Max Brödel: his art, legacy, and contributions to neurosurgery through medical illustration. *J Neurosurg*. 2011 Jul;115(1):182–190.
3. Culley J. Creating a digital medical illustration. *J Vis Commun Med*. 2016 Jan-Jun;39(1–2):77–84.
4. Kirsch J, Geller BS. Using photoshop filters to create anatomic line-art medical images. *Acad Radiol*. 2006 Aug;13(8):1035–1037.
5. McCarty JL, Gołofit P, Tigges S, Skalski M. Digital Medical Illustration for the Radiologist. *Radiographics*. 2018 Jul-Aug;38(4):1145–1157.