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Demand for Telemedicine Increasing with the Growth of Technology

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Abstract

Feasibility has been shown for several specific applications of tele-medicine within hand surgery, but broader applications of Tele-medicine have not been fully evaluated. Currently, with the global COVID-19 pandemic and widespread stay-at-home orders, providers have been faced with growing pressure to evaluate patients from a distance.

Keywords: Hand surgery; Patient contralateral; Arthritis; Vascular assessment; Physical examination

Introduction

Subsequent studies should be performed to validate the broader application of telemedicine in hand surgery, but efforts should be made now to continue to meet the current needs of our patients. The comprehensive hand examination in a traditional office visit typically involves inspection and palpation, vascular examination, sensory examination, and motor examination. The ideal position for examination is with the patient across from the provider, with the patient's hands resting on a table. Complete inspection consists of observing how the patient holds the hands and assessing for visible signs of injury or trauma such as swelling, erythema, ecchymosis, and laceration [1]. Inspection should include having the patient demonstrate the digital cascade through flexion and extension, paying close attention to deficits in ROM or mal-rotation. Palpation should assess for areas of localized tenderness, swelling, or masses. Areas of localized swelling or erythema should also be assessed for associated fluctuance and warmth. Vascular examination consists of a peripheral pulse examination, temperature, colour assessment, and capillary refill [2]. A proper sensory examination should consist of the ability to discern light touch, as well as 2-point discrimination in the relevant sensory distributions. A motor examination should begin with assessing for passive ROM across all joints in the hand and wrist. All extrinsic flexors, extrinsic extensors, and intrinsic muscles should be assessed with and without resistance. Finally, specialty tests should be performed, such as provocative tests for carpal tunnel, cubital tunnel, and de Quervain tenosynovitis, among others. Using the normal in-person hand examination as a framework, we can systematically go through and assess each step or maneuver for feasibility during a remote, telemedicine encounter.

Methodology

Patient positioning is important during in-person examinations, equally so when remote. However, limitations in camera positioning poses challenges for both the patient and the provider [3]. Ideal positioning would have a camera looking down on the patient's hands, as if directly across from the provider as shown in (Figure 1). However, this cannot be independently achieved with all personal computers or smart devices [4]. In addition, this camera angle prohibits eye contact with the patient, which could prove detrimental to communication during the examination. The use of a smart phone poses additional limitations as one hand may have to be used to hold the device. If a smartphone is the only option for a patient, the assistance of a family member or friend may be warranted for videotaping. Alternatively, patients can be instructed to secure the handheld device in a vertical position across themselves for the optimal perspective [5]. During the physical examination, inspection can be accomplished with minimal limitation. Adequate assessment for trauma and other signs of injury can be performed, as well as observation of the digital cascade. Palpation cannot be performed remotely, and thus detailed assessment for tenderness, as well as localization of any masses, is limited by remote examination [6]. The vascular examination had limitations as well. Peripheral pulses and temperature cannot be properly assessed, whereas colour and capillary refill can be reliable. It is not possible to conduct formal sensory examination with 2-point discrimination remotely.

Discussion

Most aspects of the motor examination can be accomplished remotely, aside from strength against resistance. Passive ROM can be performed with the use of the patient's contralateral hand to demonstrate end ROM. With the use of graphical instruction or visual demonstration, motor function for each muscle group in the hand and wrist can be evaluated with the assistance of the patient's opposite hand [7]. Although the patient can perform these maneuvers independently, the provider is unable to make a quantitative strength assessment without providing resistance. Thus, distinguishing strength for grades 3, 4, and 5 of 5 is impossible. Certain special tests and provocative maneuvers can be consistently performed whereas others cannot.

Figure 1: Eye contact with the patient could prove detrimental to communication.

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For example, Tinel or Durkan test cannot be performed for carpal tunnel [8]. However, Phalen test can be performed independently to recreate the subjective symptoms of carpal tunnel. For cubital tunnel, Tinel test cannot be performed but the elbow flexion test serves as a good alternative. Others, such as Finklestein, Froment, triangular fibrocartilage complex load test, and Cozen tests all can be modified and performed independently in the remote setting. With the feasibility of each aspect of the physical examination in mind, we established our approach to the remote physical telemedicine encounter. In anticipation of the limitations of the remote examination, there should be an increased focus on taking a detailed and focused patient history. The first consideration when initiating the examination portion of the encounter is patient positioning [9]. Most of the examination will be conducted with the patient facing the device's camera, with the shoulders centred in the frame as shown in (Figure 2). This is most easily accomplished with the use of a personal laptop that allows for easy camera adjustment in the vertical axis. Begin with inspecting the dorsal and volar aspects of the hand and wrist by having the patient hold the hands up and go through the range of full pronation and supination [10]. Pay specific attention to deformities such as swan's neck, mallet, or boutonniere, or signs of Dupuytren disease or arthritis. Ask the patient to make a series of fists by flexing and extending all digits. This should be performed with the patient's hands in full pronation with palms facing the camera, as well as in a neutral position with the palms perpendicular to the camera. This allows for complete visualization of the digital cascade [11]. The entirety of the forearm, elbow, and upper arm to the shoulder should be visualized as well. Expanding the scope of inspection may improve the accuracy of the examination and provide additional clues that may complement the limitations of the telemedicine encounter. Because palpation cannot be accomplished remotely, we propose that graphical depictions of relevant surface anatomy and anatomical orientation using layman's terms be given to the patient to aid in this portion of the examination. The provider should move systematically through each area of interest, showing the patient where to press. Although this can be variable in accuracy and success, it can help the patient communicate more effectively and localize areas of tenderness or masses to the provider [12]. The vascular portion of the examination is performed by assessing for abnormalities in colour and having the patient perform the capillary refill test with the fingernail near the camera. For practical purposes, when scheduling a telemedicine appointment, it is vital to know the devices to which the patient has access, if the patient is able to use them properly, and, if not, whether anyone in the household is able to assist before the start of an encounter. A pre-visit contact with the patient establishing technological aptitude can be beneficial to the success of the telehealth encounter. This communication may be accomplished by the person scheduling the visit, a medical assistant, or a physician extender. Patient confidentiality should always be protected and telemedicine practices must comply with Health Insurance Portability and Accountability Act of 1996 rules and regulations [13]. Thus, patient health data and video conferencing security are important considerations when initiating telemedicine encounters. Although many commonly employed video conferencing platforms are safe and appropriate for use in this setting, proper compliance requires entering a HIPAA business associates agreement with a technology vendor to ensure data security [14]. With the declaration of a national health emergency from COVID-19, the Office for Civil Rights at the Department of Health and Human Services announced that to access a greater number of patients and limit risk for infection, it will not impose penalties for video-chatting noncompliance with HIPAA. This provision lasts for the duration of the national health emergency and applies to the use of telemedicine for any reason, not just illness relating to COVID-19. Thus, lack of a business associates agreement should not prohibit providers from using telemedicine, but providers should be sure to establish proper compliance if they wish to continue telemedicine practices outside the national health emergency provision. Although limitations exist for hand surgery telemedicine visits, especially as they pertain to aspects of the physical examination, we believe that with thoughtful consideration of examination maneuvers and appropriate patient selection, a significant amount of patient encounters can be effectively conducted remotely. Hand surgery is an area specialty, not a tissue specialty, and therefore needs a surgeon who has been trained in the three disciplines of orthopaedic surgery, plastic surgery, and neurosurgery. Such men are rare and were hard to find when the centres were created. However, the surgeons who staffed these centres, and all of whom were pioneering in this new field of surgery, produced conclusive evidence that reconstruction of hands can be successfully undertaken and that crippled hands are worth salvaging. Open hand injuries are a very common presentation to the emergency department, most commonly involving young men.

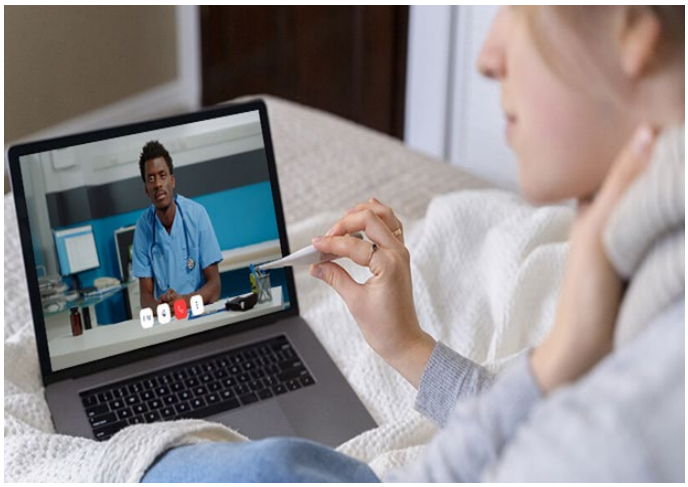

Figure 2: Dorsal and volar aspects of the hand and wrist.

Conclusion

As a result, there are potentially substantial costs to society, for instance, with the absence from employment due to these injuries. This is a heterogeneous group of injuries ranging from contaminated wounds with tendon and nerve damage to open fractures, and it is challenging to apply standard recommendations regarding antibiotic prophylaxis and treatment. Consistent with the parameters of the current Australian Therapeutic Guidelines, generally perioperative antibiotics will be started unless the wound is a clean injury.

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Conflict of Interest

None

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