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CASE REPORT

THE USE OF VIDEO MMS FOR REFERRAL OF ACUTE SUBDURAL HAEMORRHAGE

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Neurosurgery is a specialised field of medicine restricted to major metropolitan tertiary hospitals. A number of neurosurgical conditions are high acuity medical problems which may require rapid diagnosis and treatment. Peripheral hospitals need to convey not only clinical, but also radiological information rapidly and accurately to the receiving neurosurgical unit. We describe a case report of the use of video MMS to aid in the referral of a 60 year old man with an acute on chronic subdural haemorrhage to a neurosurgical unit, expediting the transfer and definitive management of this patient.

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Case Report

A 60 year old male presented to the emergency department of a rural hospital following a minor head injury with symptoms of confusion and headache for ten hours. Significant past medical history included atrial fibrillation (treated with warfarin), diabetes and hypertension. Initial clinical examination revealed a Glasgow Coma Scale (GCS) of 12 (eye opening to voice, localizing to pain, confused), and weakness was noted on the left side graded at 3/5. Lab testing revealed a normal platelet count and an elevated International Normalised Ratio (INR) of 3.2. An urgent Computerised Tompgraphy (CT) brain (CTB) was performed and a right sided 1.7cm acute on chronic subdural haemorrhage (SDH) with 8mm of midline shift was seen. The hospital had no after-hours radiology service thus the images were sent to an off-site radiology reporting company.

After initiating reversal of warfarin, a referral was made to a neurosurgical unit. Due to the limited ability of the referring resident to interpret the scan and convey this information verbally, and the delay in waiting for off-site radiology to report the scan, the neurosurgical service requested a picture to be sent of the scan for review. Unfortunately the resident had chosen a slice of the CTB which showed minimal SDH which would not have accounted for the patient's symptoms or signs. At this stage, the neurosurgical service requested a video MMS of the CT brain. This was done by video recording using a smartphone (Apple® iPhone 4) whilst scrolling through the slices of the CTB on the hospital computer. The registrar was then able to view the entire CT brain, which showed the large acute on chronic sub-dural haemorrhage with significant midline shift which warranted immediate neurosurgical intervention.

Urgent transfer was arranged to the receiving neurosurgical unit at the tertiary metropolitan hospital. A copy of the CTB was sent on CD with the patient and was reviewed to confirm the imaging findings. The patient underwent an emergency mini-craniotomy and evacuation of SDH. Post operatively the patient made gradual improvements in their neurological state and was transferred to a rehabilitation facility day six post operatively.

Discussion

Neurosurgery is a highly specialised field of medicine, restricted to major metropolitan tertiary hospitals. The potentially high acuity of intracranial pathology means that any delay of transfer to a neurosurgical unit may result in significant morbidity and mortality. Traditionally, referral of an emergency neurosurgical condition has relied on voice-only telephone conversation and therefore verbal reporting of

imaging findings. With advances in technology, recent years have seen referrals being supplemented by emailing of images, and more recently picture multimedia messaging system (MMS). Off-site access to image viewing software has also assisted in the referral process, however with different hospitals and networks utilising different imaging software and access requirements, this is currently of limited benefit. This case report outlines how the use of video MMS, as opposed to picture MMS can aid in referral to a neurosurgical unit, expediting transfer and definitive management.

The use of video MMS in this case assisted both the referring doctor, and the registrar receiving the referral. The resident, with no formal training interpreting a CT brain was able to share the entire CT without having to select which slice to share. This resulted in the on-call registrar being able to view all of the relevant slices to gain as much information as possible. This is particularly useful in a rural emergency setting, where often there is a sole junior doctor on duty overnight.

This technology relies on both the referrer and on-call registrar to have access to a phone with MMS capabilities. There is significant cost associated with the purchase of smart phones and sending of MMS messages, usually absorbed by the individual doctor. However, Manhattan Research demonstrated that 81% of physicians in the United States own a smart phone, making this technology accessible to most doctors.[1]

To ensure best technique, the camera should be placed approximately 20-30cm away from the screen, focused on the computer screen prior to the start of recording. Camera auto—exposure should be set to give the best view of brain parenchyma/ bony windows as relevant. For example, on the iPhone 4s this can be done by clicking on 'brain' on the picture prior to starting to record. The images should then be scrolled though reasonably quickly to ensure all images in the sequence (eg axial) are seen. MMS in Australia are limited to 500kb (approximately 30seconds). If two sequences are being sent, they should be sent as separate files to reduce the chance of message send failure. Ideally, images are viewed by pausing the video MMS sequence and then scrolling backwards and forwards manually by the recipient (eg on iPhone "scrubbing"). There is also potential for sending the captured video as an email message directly from the smart phone.
Various studies have previously investigated the use of picture and video MMS for the purposes of image transfer, with most studies showing promising results.[2-5] Furthermore, the neurosurgical use of video transfer of images has previously been validated in a study by Waran et al[6] where they found that from 56 prospectively collected video MMS's interpreted by two separate neurosurgeons, they agreed on the diagnosis in every case, with only one case where the neurosurgeon's interpretation of the scan differed from the radiology report, resulting in a kappa value of 0.88.

A potential pitfall is that some smartphone cameras are fitted with only a low quality video recorder, and as such it may not be adequate in certain instances. Furthermore, the images transmitted may not be adequate to diagnose subtle lesions. However it must be noted that in most neurosurgical cases, if a lesion is too subtle to be seen, it is unlikely to represent a patient requiring urgent neurosurgical intervention. Also, it is noted that video MMS's sent via Apple's iMessage© system are of higher quality when compared to regular MMS. This is likely to be related to higher data transfer capacity over the iMessage network. In instances where the quality is too low to interpret, the recipient must be aware of this and request alternate methods of image transfer.

Maintaining confidentiality of both patient and doctors with MMS messaging also requires consideration. With smartphones requiring internet connection for MMS services, this offers the potential for phone security issues, and also for accessing images should the phone fall into the wrong hands. Ensuring smartphones are secured with a passcode (at both sending and receiving ends) can help minimize this. Where possible, it is advisable to obtain consent from patient's when transmitting their imaging to a third party, though in the emergency setting this may not be feasible.

Sharing images with this technique also requires doctors to share their personal phone numbers with one another. Whilst this can be minimised by having a smartphone dedicated to the receiving unit, one is not always provided. Conversely, by having direct contact details of the referring and receiving doctor, this does facilitate easier communication between the two parties.

Inadequately labelled video MMS messages are a potential for medical errors. If multiple referrals are received to the same smartphone, there is potential for confusion of images between patients. The video resolution is not typically high enough to read patient demographics displayed on the individual scans. There are various strategies to deal with this, such as to request the name/DOB of the patient to be sent with the image, or request that the sending doctor ensure

they focus on the name/date of birth of the image at the start of the recording before scrolling through the rest of the images.

In conclusion, Video MMS can be a very useful modality for image sharing between hospital networks, when remote/offsite access is not available. It can be particularly useful for expediting the referral and transfer of acute neurosurgical patients from peripheral hospitals, where there is often only junior medical staff and no onsite radiology service after hours. However, care should be taken when using such technology to ensure confidentiality and security of images, picture quality and accuracy of patient labelling is maintained.

References

1. Smartphones, tablets and mobile marketing. ManhattanResearch. http://manhattanresearch.com/Research-Topics/Healthcare-Professional/Mobile, 2011. (Accessed 17/03/2012)

2. Ng WH, Wang E, Ng I. Multimedia Messaging Service teleradiology in the provision of emergency neurosurgery services. Surg Neurol 2007;67(4):338-41.

3. Ling JM, Lim KZ, Ng WH. Use of Multimedia Messaging System (MMS) by Junior Doctors for Scan Image Transmission in Neurosurgery. World Neurosurg 2012;77(2):384-7.

4. Padmasekara G, Nazarian N, Wall C. The Reliability of Mobile Multimedia Messaging (MMS) for Decision Making in Distal Radius Fractures: An Effective Alternative. Journal MTM 2012; 1(1):8-12.

5. Chandhanayingyong C, Tangtrakulwanich B, Kiriratnikom T. Teleconsultation for emergency orthopaedic patients using the multimedia messaging service via mobile phones. J Telemed Telecare 2007;13(4):193-6.

6. Waran V, Bahuri NF, Narayanan V, Ganesan D, Kadir KA. Video clip transfer of radiological images using a mobile telephone in emergency neurosurgical consultations (3G Multi-Media Messaging Service). Br J Neurosurg 2012;26(2):199-201