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Clinical photographs as teaching aids: how reliable are they?

ANDREW MCCOMBE, M.D., F.R.C.S(O.R.L.)*†, PETER WILLIAMSON, M.B., F.R.C.S.†, MICHAEL HAWKE, M.D., F.R.C.S.*

Abstract

A study to investigate the value and reliability of clinical photographs as teaching aids was undertaken. Twenty colour photographs were taken using the StarMed video-otoscopic system. The pictures, which were a mixture of normal and abnormal ears, were shown to 21 experienced otolaryngologists from the UK and Canada. These clinicians were asked to identify the abnormality if any.

The median score for correctly identified pictures was 15 (range 12–18). This score was identical for both the UK and Canadian subgroups. Although the abnormalities were consistently well recognized with an average correct identification rate of 90 per cent (range 67–100 per cent), the 'normals' were recognized significantly less well at only 41 per cent (range 5–71 per cent) (chi-squared = 110.6; 1 df; $p<0.001$).

This result is probably due to failure of the camera to capture the huge variation and subtleties in the range of normal, and the clinicians' natural inclination to identify pathology, when in doubt. We would conclude that as long as this failing is recognized, clinical photographs, and specifically those from the video-otoscope, represent a useful and reliable teaching tool.

Key words: Photography, clinical; Teaching materials

Introduction

Visual aids have long been used in medical education and training as testified by the abundance of published colour atlases, medical illustration departments, the long history of medical illustration and traditional bedside teaching methods. Despite this long-term acceptance that visual images are a useful aid to medical teaching, perhaps even an integral part of it, there has been very little work carried out to quantify their value (Marshall and Evans, 1992). Furthermore, there can be little doubt that with the expected changes in both the undergraduate medical curriculum (Calman, 1993) and in the style and duration of postgraduate training (Department of Health, 1993), not to mention the explosion of minimally invasive endoscopic methods of surgery, there will inevitably be an increasing demand for effective and efficient, visually- (read video)-based teaching aids.

Otolaryngology is a particularly visually orientated speciality and until recently training has been hindered by the relatively hidden nature of its subject material. The small orifices of the head and neck do not allow access for multiple pairs of eyes! (Gardner, 1992). Demonstration of the eardrum and its abnormalities has always been difficult as visualization is usually only possible by an individual. Even with the assistance of an operating microscope with its teaching arm does not guarantee that teacher and student(s) will manage to see and talk about the same anatomical details. The development in recent years of video-otoscopic systems allows the ear and its abnormalities to be demonstrated in colour on a television monitor. This certainly guarantees that teacher and student will see the same image The assumption is then that the image will demonstrate the appropriate clinical features well enough to allow teaching of the student.

This study was performed in an effort to test this assumption and thereby quantify the reliability of some of these clinical images.

Materials and methods

Twenty randomly selected subjects presenting to the senior author (MH) were recruited for the study. Fifteen subjects had otological pathology and five had completely normal ears.

All subjects underwent a full clinical assessment and were examined by both AM and MH under an operating microscope (Zeiss, Switzerland) and a

From the Departments of Otolaryngology, University of Toronto*, Toronto, Canada and the Royal United Hospital†, Bath, UK.
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diagnosis of the pathology or normality made. All subjects were then examined using the StarMed video-otoscopic system (Starkey, Minneapolis, Minnesota). This system comprises a JedMed fibre optic light source and colour rod/camera system (JedMed Instrument Co., St Louis, MO) with a Panasonic CT1383Y colour monitor and RP60 video printer (Panasonic Matsushita Electric Corporation of America, Secaucas, NJ). Once an optimal view of the ear had been achieved with the camera, a still photograph was captured from the screen using the colour video printer. This produced 20 pictures, one for each subject.

The still pictures were then shown in random order to 21 otolaryngologists, with a minimum of three years experience, in both Canada and England. Each clinician was asked to describe the abnormality, if any, in each of the images. The scoring system was based on whether the abnormality, or lack of it, was correctly identified. If it was, a point was scored, if wrongly identified or if no identification was made, a zero was scored. Statistical analysis of the results was performed using non-parametric methods.

Results

The results for correct recognition of each picture are summarized in rank order in Table I. The 'normal' pictures were consistently poorly recognized with an average correct recognition rate of only 41 per cent (range 5–71 per cent). The 'abnormals' were however consistently well recognized with an average correct identification rate of 90 per cent (range 67–100 per cent). This difference between recognition rates for the 'normals' and 'abnormals' was statistically significant (chi-squared = 100.6; 1 df; $p<0.001$). The most common 'misdiagnosis' was a 'normal' being described as a serous otitis media.

TABLE I
IDENTIFICATION SCORE FOR EACH PHOTOGRAPHIC ILLUSTRATION (IN RANK ORDER)

Feature	No. correct	% correct
Normal	1	5
Normal	4	19
Normal	11	52
Normal	12	57
Foreign body	14	67
Normal	15	71
Chronic suppurative otitis media	16	76
Scarring	17	81
Mastoid	17	81
Perforated	18	86
Perforated	18	86
Perforated	19	90
Exostoses	20	95
Incudo-stapedopexy	20	95
Tympanosclerosis	20	95
Grommet	21	100
Glue ear	21	100
Exostoses	21	100
Polyp	21	100
Grommet	21	100

The median score for each individual clinician, in terms of correctly identified pictures, was 15 (75 per cent) with a range of 12–18 (57–86 per cent). Fortunately for diplomatic relations, the average scores for both the Canadian and British otolaryngologists were identical!

Discussion

This study has clearly shown that the StarMed video-otoscope provides a reliable demonstration of otological pathology but is less satisfactory when demonstrating normal appearances. It is our premise that this finding will apply, certainly to other video-otoscopic systems, but that it may also apply to other forms of visual imaging.

Why should the range and nuances of normal not always be well demonstrated?

We would suggest that there are two conspiring reasons for this. Firstly, there is a huge range in the appearances of 'normality' with many hues of colour and degrees of light reflection to a normal tympanic membrane. This is not always well reproduced by a camera. Secondly, with an obvious abnormality present, attention will be drawn to it and a diagnosis made. In the absence of an obvious abnormality, as in a normal ear, a career long training of trying to identify pathology almost forces the clinician to try and identify pathology. Given the previously mentioned comments with regard to the huge variation in normal appearances, it is probably no surprise that the most commonly selected pathology therefore becomes serous otitis media. It is particularly noteworthy that this occurred despite the fact that the clinicians were told that a number of normal ears were included in the picture set. It was also interesting to witness the surprising degree of 'anxiety' produced by the 'test' scenario in most clinicians.

What is the effect of our methodology?

It is certainly very uncommon for any clinical visual image used in teaching, or otherwise, to appear without the support of some form of narrative, either verbal or written. It is not so uncommon, however, in the clinical situation where a diagnosis may have to be made on the basis of a visual appearance with the help of only non-specific symptoms in the history. With this in mind it is probably reasonable to suggest that a clinical image should be recognizable even without the help of accompanying narrative. Furthermore, if a picture is not recognizable by an experienced clinician in that field then its value as a teaching aid has to be questionable. We would therefore suggest that our method of assessing images has both validity and relevance. To some extent this was confirmed by the high correct identification rate of the abnormal pictures.

Finally, if these results are as broadly representa-

tive as the identical scores for the British and Canadian clinicians would indicate, then it would seem reasonable to suggest that in fact a video-otoscopic system, and the pictures taken from it, are a valid and reliable teaching tool, with the proviso that the range and nuances of normal are not always well demonstrated. Although it is likely that this shortcoming might be minimized by its recognition, and the aid of a teacher's supporting remarks, to fully appreciate the range of normality, there is still no substitute for looking at patients!

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Address for correspondence:
Mr A. McCombe,
Department of Otolaryngology,
Frimley Park Hospital,
Portsmouth Road,
Frimley GU16 5UJ.