The Practice of Telepathology in India

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ABSTRACT

Telepathology in India is still in the evolving stages. Although, much progress has been made around the world specially in the field of digital imaging and virtual slides, the practice of telepathology in India still revolves around static telepathology, be it in telelearning or distance learning, or in remote diagnosis. Websites such as telepathology.org.in have been very successful in popularizing telepathology through quizzes of interesting and rare cases. The only study of teleconsultation from India, has shown that a good concordance with glass slide and static telepathology images. The reasons for the relative delay in acceptance of telepathology in India are manifold.

Virtual slides are digitized slides where one is allowed see the slide in different magnifications, just like a microscope, and without the need of having multiple images. Image acquisition of an entire microscopic slide is done at all magnifications available on the microscope. The software drives the motorized stage to acquire all fields of view and then seamlessly stitches the fields into a single image. These virtual slides have extremely large file size, sometimes exceeding 1.5 GB, and hence cannot be transferred easily with the present network bandwidth limitations. Such slides are therefore stored in 'virtual slide boxes' where database storage can be done on a central server. Virtual slide viewers have been developed for use with this virtual slide database and rapid and interactive visualization with any portion of the image and at any magnification is possible. The fourth generation telepathology imaging systems use miniature microscope arrays (MMAs). The output from about 100 miniaturized microscopes is simultaneously captured by 100 individual digital images. The result is a virtual slide that can be produced in minutes. Such systems promise to transform histopathological laboratories in the very near future.

Digital imaging applications have come a long way to the present status. Use of modern digital cameras rather than chemical photography has the added advantages of lower running costs, early archiving, dissemination, transmission, and even the possibility of medical vision systems. It also provides a tool for adjusting, enhancing, and annotating medical images. Optimizing images without falsifying them using software such as Adobe Photoshop can also enhance an

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image to exactly what is observed on gross examination or under the microscope.

The applications of telepathology, like those of telemedicine can be broadly classified into two major groups: second opinion and distance learning. The best example of the use of telepathology for second opinion is the ‘sol’ pathologist who is required to be a ‘specialist’ in every field of pathology, which is impossible however hardworking one might be. In remote and rural areas where because of economic reasons, one cannot afford to have a competent pathologist, telepathology is considered to be a boon. The UICC has estimated that in at least 5–10% of cancer cases, a pathologist is confounded with uncertainty.[12] In this and in situations where one can consult outstanding specialists in the diagnosis of controversial cases, telepathology is the answer. Distance or telelearning in pathology has also gained acceptance. Telepathology has been used for research applications, distance education, quizzes, and online atlases with astounding success.

**Telepathology in India**

India was not lagging far behind in the field of telepathology. The first taste of telepathology in India was provided at a symposium organized in the 50th Annual Conference of the Indian Association of Pathologists and Microbiologists in Mumbai in 2001 aptly named Telepathology: Today and Tomorrow.[13] Since then a number of symposia and workshops held in different parts of the country have contributed to popularize this tool both at the national and the state level. A telepathology quiz page was opened in the popular pathoindia.com[14] e-group and interesting cases were put up in the form of a quiz. Some of these cases were also hosted for discussion at http://ipath.ch, which is a free site offering an open source framework for building web- and email-based telemedicine applications.[15] With the experience of pathoindia.com came telepathologyindia.com (now telepathology.org.in).[16] The use of “telepathology quizzes” with images of cases hosted at telepathology.org.in has caught the imagination of pathologists in India, both young and old. These quizzes consist of publication of a brief history of the patient and adequate diagnostic images, and invitation is sent by emails to hundreds of pathologists by the group list at pathoindia.com. Anyone can present a case, and judging from the flurry of replies one gets, this sort of telelearning is indeed very popular. Telepathology.org.in also attempted to give free consultancy service to pathologists in India. However, only about 12 pathologists from around the country and abroad have taken advantage of this service till date.

The experience of Desai et al.[17] in using static telepathology consultation between a tertiary cancer centre (Tata Memorial Hospital) and a rural cancer hospital (Nargis Dutt Memorial Cancer Hospital) in Barshi, Maharashtra is an eye-opener. The authors have proved that using existing telecommunication facilities and a 56 k modem, it was possible to have good telepathology consultation and a concordance rate of 90.2% was observed. The project bore fruit after overcoming initial difficulties of ‘unreliable and inconsistent’ communications and through perseverance and cooperation amongst various organizations such as Department of Telecommunications (DOT), Mahanagar Telephone Nigam Limited (MTNL), and Bharat Sanchar Nigam Limited (BSNL). The experience gained can serve as a model to make telepathology a working reality in rural India. A possible way to overcome such inconsistencies in network facilities in India, is the use of web-based telepathology systems, as described by Brauchli et al.[15]

In spite of recent Government initiatives to improve the telecommunication facilities, and the necessity that is obviously there, telepathology is yet to permeate into everyday activities for pathologists in India. The reasons for this are manifold. The lack of agreement on a preferred technology and the lack of uniform standards acceptable to the pathology community have been the major factors responsible for the underdevelopment of telepathology all over the world. One major drawback in rural India is the sub-optimal preparation of slides. Images for remote diagnosis, after all, can only be as good as the original slides. A relative reason for the failure of telepathology consultation and the inability of experts to come to a conclusive diagnosis, apart from sub-optimal images, is the absence of a rapport between the sending pathologist and the consultant pathologist. The latter would rather not give a diagnosis based on images sent by a third party. This was the experience we faced in telepathologyindia.com (now telepathology.org.in). Finally, there has been a resistance from senior histopathologists in India for the promotion of telepathology. This could possibly be because of a negative preconception about telepathology. Reassurance of potential users is necessary because these perceived problems are human, rather than technological.

**Conclusions**

Great technological advances are taking place throughout the world in the field of telepathology. The concept of digital imaging and virtual slides has taken the world by storm. In India, telepathology is yet to take shape. Although, it has been conclusively proved that even with the existing and primitive telecommunication systems, telepathology works, even in rural areas, many factors are responsible for its delayed acceptance in India. Perseverance, cooperation and the willingness to promote telepathology seem to be the order of the day.

**References**

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