Available online at www.sciencedirect.com**SciVerse ScienceDirect**journal homepage: www.elsevier.com/locate/jcot **Editorial****Emerging technologies in orthopaedics: Are we ready for the challenge?**

Just few weeks back, while surfing the net, I stumbled upon the programme schedule of a major orthopaedic conference of the world. The list consisted of the usual presentations in the various subspecialties, symposia and the general topics of interest for the orthopaedic surgeons. One thing which caught my eye was the section devoted to the latest technologies in the field of orthopaedics. This made me think regarding the state of affairs in our own country regarding the same. Are we even cognisant of the latest technologies in the field of science and communication which have inundated the market and made their way into the medical field as well? Orthopaedics has long been considered to be a specialty which relies more on getting the investigations done to diagnose the pathology and offer treatment for the same. Most of us work in the 'macro' world looking at the radiographs, MRI and the CT scans and do not think about the 'micro' world. With the unfolding of the new millennia, there has been a lot of change in all fields including orthopaedics. But the question still remains; are we, the orthopaedic surgeons in India, even aware of these changes? What efforts are being made to incorporate these changes in our specialty or our curriculum?

Let's take the example of Information Technology (IT). This technology, though driven in the entire world by our own countrymen in the field of computer engineering, is highly developed in the west but unfortunately its use in the field of medicine in India is still in its infancy. How many hospitals, even in the capital city of New Delhi, are investing to collect, store, retrieve or transfer clinical information electronically? For years, the health care in our country has missed out on the huge benefits that information technology has bestowed upon the rest of the economy. Even the hospitals which have joined in this field have done it half-heartedly and there has been a gross underachievement in the decades of high growth in other fields of economy. The irony is that we have embraced the smart phones and other similar technologies in the social sphere of our lives without any hesitation but still feel that our profession does not require their use. The first question asked by doctors and administrators alike is, "What is the use of such technology in our field?" if we look at the evidence in the medical literature, there has been considerable research on healthcare IT adoption and benefits during the past decade showing that the usage of IT in the field of medicine has improved the quality of the services by providing more timely

clinical information, diagnosis and even treatment for the patients.^{1–3} Another area of quality improvement due to the IT has been in reduction of medical errors and improving patient safety.⁴ Once implemented, the benefit due to this technology to the society at large is enormous. When the hospitals are linked together with this technology, all the partners in providing healthcare can benefit from this. The hospitals shall become more accountable; the medical professionals shall know their performance levels along with their success and complication rates while the insurance companies can grade the different hospitals and provide incentives for good performance. The main challenge in our country is to build upon the capacity levels, not only at the tertiary level, but at all levels of health care provider. Even the general public has to be made knowledgeable in this regard. However, the silver lining is the fact that India is the leading country of the world in computer technology. It is certainly within the means of our country to develop the required information technology software catering specifically to our needs. What is required is the belief that we, the medical professionals, can also give our best in the implementation of this revolution in our country.

Another field of interest and great research in the world, at present, is the application of nanotechnology in the field of orthopaedics. Nanotechnology is the science of placing, measuring, manipulating and modelling of matter which is the size of a nanometre, i.e., 1/75,000th width of a human hair. It is said that the range below 100 nm is more important as the classic laws of physics change here leading to novel physical properties. This may allow the researcher to produce a new material with properties and strength beyond the conventional limits.⁵

The nanomaterial is considered to be the next generation of the improved orthopaedic implant with surface properties more conducive for bony in growth.⁶ The potential use of nanotechnology is enormous. It includes the development of biodegradable tissue –engineered ligament replacements, fluorescent biological probes in imaging of bony tumours, site specific targeted drug delivery, cancer therapies and gene therapy.⁵ It has been observed in research that the nano-structured titanium attracts three times more calcium deposition by osteoblasts as compared to the conventional titanium.⁷ This provides tremendous scope for improving the osseointegration of the implants at the host–implant interface. One of the most notable future applications and the

greatest short-term impact of this technology seems to be in the drug delivery mechanism.⁸ Anti-inflammatory arthritic treatment, nanofibrous membrane wound dressing are encouraging advances which may lead to better, prolonged action along with faster healing. The use of silver in the nanocrystalline form is one of the major advances in this field. This technology may also help in enhancing the healing effect of the BMP released from a composite nanofiber matrix than the conventional injection.⁹ This technology is already there at our doorstep with the expected worldwide market for the same to reach 1 trillion US dollars by 2015.

We just have to introspect and think seriously, whether we are ready for this challenge? The challenge to be at par with the developed world, in the realm of the new scientific renaissance. Three centuries ago, we missed the first awakening of the scientific outlook across the western world due to the subjugation of our country. Today again, the opportunity is knocking at our doors. Let's not miss the bus, this time, due to our ignorance or laziness.

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