

# Don't start the revolution without us !

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Many who are shopping for a new computer face a dilemma - they would like one that does less than those offered. The prospective buyer may simply want to write letters. He finds computers and software that enable him to author books and multimedia publications. Of course, you don't have to use all the features and power of your computer and software, but nobody likes to buy a loaf of bread and eat only a slice.

The computer industry recognises this problem. Huge software "suites" that can do more than the average user can imagine let alone want have been dubbed "bloatware". There has been intense recent interest in so-called "Internet machines". These are low-price, stripped down computers that have one main purpose - to connect to the Internet. They will, by today's elevated standards, have slow processors and little memory. The user who wants to use this computer for a particular task will pull the relevant program off the Internet, use it for that specific task and discard it. Instead of storing large volumes of data on your own computer it is proposed that servers, accessed over the Internet, be used.

Some problems contain the seeds of their own solution. This is a solution that contains the seeds of its own problem. Anyone that has used the Internet knows that "Netsurfing" is a misnomer - "Webcrawling" is a far more appropriate metaphor. This modern version of the server/dumb terminal concept may work

in a fast local network situation but the current speed of Internet traffic makes it a dubious starter in this context. The modern standalone desktop computer is immensely powerful, and is becoming increasingly affordable and easy to use. Communication between computers on opposite sides of a city, country or the world is also improving in many ways. Modern software facilitates the connecting of computers and the exchange of information. Finland has the most advanced telecommunications infrastructure in the world, having had a high speed ATM (Asynchronous Transfer Mode) backbone in place for two years while most other countries are still talking about the technology. The Finns were also the first to have a GSM network - in 1991. It is of interest to note that Finland has always had an unregulated telecommunications market. As Vincent Schmidt of ADC Telecommunications has said regarding the shortage of bandwidth for the Information Highway, "...these problems will be solved. If there is a path to money, people will find it."

However more immediate, urgent and relevant other demands on the South African public purse appear, neglecting our onramp to the Information Superhighway will so weaken our competitiveness as a nation that the mouths we so justifiably want to feed now will simply be replaced by a greater number in the future and a spiralling descent into third-worldness will become unstoppable.

You may well ask, "What has all of this to do with Radiology?" I believe that medicine in general and radiology in particular are excellent examples of the need for affordable fast data communication. As we stare, like startled rabbits, into the oncoming headlights of

managed health care those of us in private practice realise that increased efficiency and the pursuit of new markets is essential. I'm sure we all hate the cold business-like ring of that, but it appears that we are no longer going to be able to avoid being businessmen. High quality teleradiology is one of the tools we can use in this regard. I stress high quality. If images are to be reported on via teleradiology, without subsequent review of the films, meticulous attention to quality and adherence to the emerging standards is required. Unless the source venue is of low volume or there is acceptance of long turnaround times maintenance of quality will generally require greater bandwidth than telephone lines and modems can provide. For moderate volumes BRI ISDN may be the answer, if you can get it. Over short distances the cost of a dedicated, leased diginet line may be justifiable. However there is no currently acceptable solution for reporting films taken in remote areas. Reducing bandwidth requirements by decreasing the resolution or colour depth (bits per pixel) is fraught with danger. Compression up to some as yet undetermined point is probably OK but remember there is no such thing as a free lunch or even an inexpensive byte.

For those with Internet access and who would like to see what the World Wide Web has to offer radiologists a good starting point would be the RSNA's Web site at:

<http://www.rsna.org/rsnahome.html>

You'll find information about courses and congresses as well as the RSNA's teaching resources. There are also many links to other useful Web sites. Another excellent site to find good radiology links is at Emory's Weblink:

<http://www.gen.emory.edu/medweb/medweb.radiology.html>

One of the best destinations I have come across is the University of Iowa's Virtual Hospital. The radiology page is at:

<http://indy.radiology.uiowa.edu/Providers/ProviderDept/InfoByDept.Rad.html>

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Don't let these daunting addresses fool you into thinking you can cancel your journal subscriptions and sell your Radiology textbooks yet. Only the foundations of the Information Highway are currently under construction. Information is still very patchy and varies from excellent to non-existent. The 'Net gives you a peep into the future rather than a currently dependable source of information.

Relevant Usenet newsgroups are :

alt.image.medical

sci.med.radiology

sci.med.telemedicine

comp.protocols.dicom

The computer revolution that has swept the world over the last two decades has been manic in its pace. Even in this high speed context the current construction of the "Infobahn" is frenetic. The World Wide Web is said to grow at 50 per cent per month. Microsoft reportedly has more people working on Internet products than on any other

single project. The huge profits realised by Internet entrepreneurs has led to the claim that it is the last gold rush of the millennium. In the words of Bill Gates, CEO of Microsoft, "We are watching something historic happen, and it will affect the world seismically, rocking us the same way the discovery of the scientific method, the invention of printing, and the arrival of the industrial age did.... The highway is going to happen." It's up to us to make sure we're not stranded on a sideroad.

## Intraoperative digital subtraction angiography in neurovascular disorders

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angiography). Martin *et al* reported close correlation between intraoperative and postoperative angiograms in their series.<sup>3</sup> There were three false negative intraoperative angiograms in 66 patients (2 residual aneurysm necks and a small residual thalamic AVM). We did not perform postoperative angiography to correlate with the intraoperative angiographic findings.

It is well recognised amongst neurosurgeons that the successful treatment of intracranial aneurysms and AVMs is dependent on complete obliteration. Postoperative angiograms are performed routinely in some units following aneurysm clipping. In a series of 715 cases Fuerberg *et al* found a residual aneurysm neck in 3.8% of cases.<sup>4</sup> Lin *et al* documented regrowth of aneurysms from residual necks in 19 cases.<sup>5</sup> Fourteen of these cases presented with a rebleed at an average interval of nine years from clipping. Intraoperative angiography enables the surgeon to identify and correct any incompletely treated lesions under the same anaesthetic. It has also been suggested that the immediate availability of intraoperative angiography allows the surgeon to access the extent of resection of an AVM at any stage and therefore avoid excessive resection that may include normal

brain and nutrient arteries.<sup>6</sup> It is well documented that normal arteries can also be inadvertently occluded by aneurysm clips.<sup>3,6,7</sup> Immediate recognition of this may prevent infarction.

We have found intraoperative angiograms useful in patients presenting with nontraumatic subdural haemorrhage and nonhypertensive intracerebral haemorrhage who are acutely deteriorating secondary to mass effect. An angiogram in theatre allows the surgeon to identify and treat any underlying aneurysm or AVM.

Intraoperative angiography is particularly useful in the management of mycotic aneurysms for several reasons. Surgical localisation may be extremely difficult as they are commonly situated on a peripheral vessel and are hidden away in a sulcus. These aneurysms can spontaneously thrombose or appear at new sites on the cerebral vasculature.<sup>8,9</sup> The intraoperative angiogram allows the confirmation of aneurysms about to be clipped, identifies new ones that may have formed since the last angiogram and helps localise them by using radio-opaque markers.

We have also found intraoperative angiography valuable in localising and managing traumatic false aneurysms and fistulae.

If attempted endovascular occlusion of a carotid cavernous fistula is unsuccessful, an intraoperative angiogram is invaluable in ensuring that surgical packing of the cavernous sinus has successfully occluded the fistula.

## Conclusion

In our series 29% of the angiograms performed revealed findings which altered the surgical procedure in some way. We recommend the use of intraoperative digital subtraction angiography in any neurovascular procedure where the technical result is going to be difficult to assess intraoperatively.

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