Computed tomography colonography: underutilised in Australia

CTC is a safe and accurate cancer detection technique widely used overseas but underused here

Computed tomography colonography (CTC), also known as virtual colonoscopy, is a minimally invasive method for examining the whole colon using computed tomography to acquire images after distension of the colon with air or carbon dioxide through a small rectal tube. Dedicated software enables 2D and 3D fly-through models for interpretation. No sedation is required. CTC has been used since the mid-1990s, the earliest Australian experience being in 1996–1997.[1]

Although early CTC studies showed mediocre results for detection of neoplasms, the technology — hardware and software — has advanced considerably since then. Simpler, reduced bowel preparation techniques have also been developed, which, when combined with faecal labelling, reduce false-positive findings.

Published CTC studies from the past decade have shown excellent accuracy for cancer and advanced polyp detection, with the literature now suggesting that CTC has accuracy equivalent to optical colonoscopy (OC) for detection of cancer;[2-4] CTC has a sensitivity for cancer detection of 96%.[5,6] It is now extensively used for symptomatic patients in the developed world overseas as a reliable, accurate and acceptable alternative to OC.

Performance and interpretation have been further improved through the publication of international standards for CTC[7-9] and, in Australia and New Zealand, by College-administered accreditation of radiologists.

Apart from OC, the main comparator for CTC in the diagnosis of colorectal neoplasia is double-contrast barium enema (DCBE). There is expert consensus and evidence from well conducted studies that CTC is superior to DCBE in accuracy, safety and patient acceptance,[10] suggesting that DCBE should become obsolete. Another radiological technique is magnetic resonance colonography; however, it is not widely available, is expensive, and is not well supported by the evidence compared with CTC.

The risks of CTC are colonic perforation and ionising radiation exposure, as summarised in a recent review.[4] The perforation rate of CTC has been found to be 0.035%;[4] however, this included asymptomatic extracolonic gas, which did not require treatment. The symptomatic perforation rate was 0.015%. These figures compare favourably with DCBE and OC. CTC is contraindicated in acute colonic inflammation, as the risk of perforation is considerably greater. CTC is less accurate in the diagnosis of small or diminutive polyps compared with cancer and large polyps. However, in the context of symptomatic patients, this is not relevant.

The risk to an individual of ionising radiation from CTC is low. In younger patients, a low dose protocol of < 5 mSv is recommended, incurring an average excess lifetime risk of cancer induction of 1 in 4000, a low figure compared with background risk and risk of missing cancer.[11] Older patients are less susceptible to ionising radiation risks, such that the risk may be considered inconsequential in the context of investigation of cancer in a symptomatic patient.

A further potential advantage of CTC over DCBE (and OC) is that it is not organ-specific to the colon and can detect alternative causes of the patient's symptoms; for example, in the solid organs. However, in addition to identifying important incidental extracolonic pathology, there is potential for identifying innocuous incidentalomas and for overdiagnosis.

So, despite extensive acceptance and use of CTC by much of the developed world (including New Zealand), why is CTC not widely performed in Australia? Much of the reason has been the restriction of a Medicare rebate to those patients who have had an incomplete OC within the previous 3 months.

A submission to the Medical Services Advisory Committee (MSAC) by the Abdominal Radiology Group of Australia and New Zealand (ARGANZ), a special interest group of the Royal Australian and New Zealand College of Radiologists, was made to widen the rebatable indications to include situations where symptomatic patients have a contraindication to OC and/or have limited availability to OC (MSAC application 1269; http://www.msac.gov.au/internet/msac/publishing.nsf/Content/1269-public) (Box). The outcome was largely negative and, we believe, makes little sense from an evidence-based and patient-centred approach. The only positive outcome was that it was recognised that CTC should be performed where there is a contraindication to OC; however, importantly, this requires specialist referral.

The current listing for Medicare Benefit Schedule item number 56553 for CTC in symptomatic or high risk patients stipulates that the patient must:

- have had an incomplete OC in the previous 3 months, have a "high-grade colonic obstruction", or have been referred by a specialist or consultant physician who performs OCs; and
- not have undergone CTC in the previous 36 months.

Leaving aside that high grade obstruction is an indication for urgent hospital referral and a contraindication to a standard CTC, this item description means that:

- there is an appropriate recognition that there is international multidisciplinary agreement that an incomplete OC is an important indication for CTC,[12] but the 3-month and 36-month qualifiers are arbitrary and not evidence-based;
- for patients with a contraindication to OC or the sedation involved, or for those with a preference for CTC over OC, CTC can only be undertaken after a specialist referral, adding cost and potential delay in diagnosis for patients with symptoms consistent with colorectal cancer. This implies that general practitioners are

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Abdominal Radiology Group of Australia and New Zealand consensus opinions on computed tomography colonography (CTC)

- Optical colonoscopy (OC) and CTC cannot currently be recommended for routine screening in asymptomatic patients in Australia
- CTC is a safe, accurate and acceptable alternative in symptomatic patients who are unsuitable for OC or who do not have access to timely optical colonoscopy
- CTC should replace double-contrast barium enema
- CTC is highly effective in excluding colorectal cancer
- CTC should be performed in patients with a previous incomplete colonoscopy
- The following comply with existing expert consensus guidelines:[7-9,12]
  - polyps > 10 mm detected at CTC should be referred for OC for polypectomy, if feasible
  - polyps 6–9 mm can either be followed with repeat interval CTC or referred for OC, dependent on clinical circumstances and patient preferences
- Current Medicare restrictions should be removed to allow general practitioners to request CTC directly, and to remove the requirement for OC in the preceding 3 months ◆

incapable of determining the presence of a contraindication to OC; and

- GPs can still request the inferior test of DCBE without any Medicare Benefits Scheme qualifiers and, in many jurisdictions, can refer patients to open-access colonoscopy (a more invasive test than CTC) without a prior specialist consultation. However, they cannot refer directly for CTC — a situation that appears to us to be illogical.

The ARGANZ submission to the MSAC also included an application for CTC to be rebatable under Medicare when access to OC services is limited. In Western Australia, the waiting period for OC may be over 12 months. The ARGANZ submission pointed out that in other jurisdictions such as the United Kingdom, Canada and New Zealand, CTC has been used to alleviate waiting lists for colonic examinations.[13-15] Such a strategy can be combined with stratifying patients according to their family history for cancer risk and symptom combination and the risks to them of an OC, enabling patients at high risk of cancer to be expedited for OC, and patients at lower risk of cancer, older frail people and those with comorbidities to undergo CTC.[15] This is based on the premises that CTC will obviate the need for OC in most patients because the incidence of significant colonic pathology is low even in symptomatic patients,[15] and that the negative predictive value of CTC for cancer is very high (about 96%).[5] It is pertinent to note that the MSAC rationale for rejection of the submission for Medicare funding for this indication included the statement that there is no published direct comparison of CTC with delayed colonoscopy and "no evidence was presented [in the submission] that demonstrated access to CTC improved health outcomes compared with delayed colonoscopy". It is difficult to see how such a trial would be ethical.

The foregoing applies to symptomatic patients. Neither OC nor CTC are recognised, or funded, as primary screening methods for colorectal cancer detection in asymptomatic individuals in Australia. Overseas data show that CTC is less expensive than OC,[16] and there is advocacy for the use of CTC for primary population screening in the United States.[17] However, based on the current evidence and in line with the joint European Societies of Gastrointestinal and Abdominal Radiology and Gastrointestinal Endoscopy consensus guidelines,[12] we do not advocate either OC or CTC for primary screening.

CTC has been suggested as an intermediate step after positive faecal immunochemical testing to reduce the number of negative OC results. Overseas studies report that this strategy is unlikely to be cost-effective.[12] However, it is uncertain whether or not this would be useful in the Australian context, where public sector OC services are already overstretched and waiting times for routine colonoscopy may be over a year. In Western Australia, there are over 8000 patients on the waiting list for OC (Chief Medical Officer, Western Australia, personal communication). By 2020, the Australian National Bowel Cancer Screening Program using faecal immunochemical testing should be fully rolled out to target 50–74-year-olds, resulting in 4 million eligible subjects. In phase 2 of the program (2008–2011),[18] there was a 38% participation rate and 7.8% of tests were positive. Of participants with a positive result, 71% underwent OC. About one in ten colonoscopies identified a cancer or advanced adenoma. Therefore, the great majority of OCs (about nine in ten) were normal. Further, the number of colonoscopies required will about double after the full roll out of the program to about 44 000 people per year. To this must be added the increasing number of patients who will require ongoing OC surveillance as a result of their index colonoscopy findings. Can our resources cope with this extra burden as well as reduce the current waiting time for OC? It may be useful to undertake careful modelling and a pilot trial of a strategy stratifying patients with positive faecal immunochemical test results into those with a higher risk (symptoms, family history) to be prioritised for OC, and those with lower risk, frail patients and those with comorbidities to undergo CTC, with a negative CTC obviating the need for OC.

In conclusion, CTC is underutilised in Australia and is an integral part of the diagnostic pathway for patients with suspected bowel cancer in other developed countries. Its appropriate use would aid in safe, accurate and timely investigation, and free up valuable endoscopic resources. Most importantly, current restrictions on the use of CTC limit patient access to timely detection of colorectal cancer.

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