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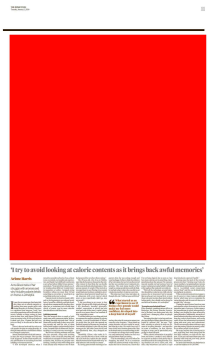

Lights, camera, action: No need to sugarcoat this new pill for children

Sheila Wayman

A camera that can be swallowed goes to the depths of a child's gut that no scope can reach

Gugulethu Matshazi and James O'Neill (15) from Ennis holding a Pill Cam a disposable camera that he then swallowed. Photograph: Alan Betson

The flashing, pill-like capsule that teenager James O'Neill is holding in the palm of his hand is a first for paediatric medicine in Ireland.

Once he has swallowed it, the micro-camera embedded in the lit-up capsule will navigate James's entire digestive system, transmitting thousands of photos to a recorder attached to a belt around his waist as it goes. These will then be downloaded for study by members of the medical team in Children's Health Ireland (CHI) at Crumlin in Dublin who are treating him for inflammatory bowel disease.

James, a 15-year-old Junior Cert student from Ennis, Co Clare, is the first paediatric patient to be able to avail of capsule endoscopy in Ireland, although it is a technology that has been used for a number of years with adults here.

Normally, an endoscopy would mean a long day for him at the hospital, as paediatric exploratory scoping is done under general anaesthetic in an operating theatre. Today, after one swallow with a mouthful of water, he is free to walk out of the clinical room with his father Aidan.

For the medical team treating him, the capsule promises to give them sight of parts of James's small intestine that standard paediatric endoscopy cannot reach. For the busy hospital, it means both a day bed and a slot in theatre are left free for another patient.

The use of capsule endoscopy at Crumlin, which is the national centre for paediatric gastroenterology, will be ramped up during 2024. The team envisage that anything between 100 and 150 of these devices will be administered by the end of the year, now that James has taken the first one.

The clinical nurse manager for capsule endoscopy, Gugu Matshazi, is clearly happy that PillCam's maiden journey in Crumlin has started so well on a grey winter's morning.

"It's my baby," she jokes, one year after she was appointed to the new team. Before that she worked as a theatre nurse with a special interest in endoscopy, having come to Dublin from Zimbabwe in 2017.

For three days before James's 8.30am appointment on this Tuesday morning, he was told to eat only low-fibre, easily digestible foods, says Matshazi. Then, from breakfast until 10pm the previous day, it was just fluids – clear fluids, such as water and energy drinks, because dark coloured ones "can taint the bowel and give the false interpretation of blood".

She did a software check-in with James, fixing the recorder belt around his waist and pairing the capsule camera with the recorder, before he swallowed the capsule.

"I struggled a bit, but I got it down first try," James tells The Irish Times minutes afterwards. "I had to put water in my mouth first, to make my mouth nice and wet so it would slide down."

A small video screen on the recorder shows the capsule in his stomach. He and his father are asked to walk around in the vicinity of the hospital until staff are satisfied that the capsule has reached the top of James's small intestine.

There is a curve, Matshazi explains, where the stomach feeds into the first of part of the small intestine. This could cause the capsule to keep bouncing back. But all is well for James and the capsule has entered his small intestine within an hour.

"When it is in the small bowel, we know it is going to go all the way," she says. "That's really important."

If the O'Neills lived in the Dublin area they could go straight home at this point, but instead they will do some shopping in the capital because they need to return the recorder to the hospital before going back to Ennis.

By early afternoon, James will be looking out for the signal on the recorder – "once it starts flashing red" – that the capsule has reached the end of the small intestine and its work is done.

"It detects where it's at, so when it's in the colon it will signal 'end of procedure' because we are only interested in the small bowel [in James's case]," says Matshazi.

Progress down the tract

While the recorder can then be returned, the capsule will continue through the colon and pass out of the body within 24 to 48 hours of being swallowed. Although James and Aidan joke about flashing poop in the toilet bowl, the capsule's light will have probably died by then as the device's battery life is about 12 hours.

In patients where the capsule is being used to examine the colon, its progress down the tract may have to be boosted by medication, to ensure it is still has power to transmit video when it reaches the large bowel.

"The capsule is an absolute godsend; this is what we have been waiting on," says Aidan, who explains how his son is believed to have Crohn's disease, but the diagnosis cannot be confirmed until medical staff can see the evidence. "There is only so far a top and tail scope can go."

James has also had an MRI scan. The symptoms of his condition – constant diarrhoea, vomiting, nausea – started showing shortly before the Covid pandemic. He had one examination "before everything went into hiatus during Covid. By the time the Covid restrictions were lifted he was in a pretty poor way," says Aidan.

On the first consultation after that, he was referred straight to Crumlin, "who have been absolutely fantastic". While James "has been through the mill", needing a nasal feeding tube during the past summer, "he has done well and they have done well by him".

It was, ironically perhaps, the pandemic that speeded up the introduction of capsule endoscopy at Crumlin, "which was long overdue", says consultant Dr Séamus Hussey, the hospital's clinical lead for gastroenterology. The HSE gave all the hospital groups, including CHI, extra funding through the national endoscopy programme. However, setting up an entirely new service from scratch takes time, as it involves recruitment, training and purchase of equipment.

"The swallowing of one pill allows you to see the small and the large bowel," says Hussey of the new system, supplied by Medtronic.

"Every patient's needs are different. Sometimes we are more focused on the small intestine; sometimes we are focused on the small and large intestine. We have different pills to allow us to decide which one to focus on."

It will be used, for instance, on patients with suspected polyps, or pre-malignant changes, or inflammatory bowel disease, and for surveillance and monitoring.

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However, it won't replace the conventional first endoscopy, which uses a tiny, wired camera located at the front of a long, thin tube that's inserted into the body. On children this is carried out, under general anaesthetic, from both ends because "they often have features of Crohn's in their upper gut, whereas most adults will just have a colonoscopy".

But there are several metres of gut that neither the camera that goes down the throat nor the one that, in the case of a colonoscopy, goes up the rectum can physically reach. So seeing the entire tract through the capsule camera will allow for "a more holistic assessment", says Hussey. It can also pick up more subtle, shallow ulcers, which may not be visible with standard scoping and MRIs.

Under anaesthetic

Although, in theory, the capsule camera can be used with a child of any age, a key issue is them being able to swallow it – and definitely not bite it. Hussey says that for particularly small children, "it may still be necessary to place the capsule under anaesthetic, when we do our standard endoscopy".

"The other great benefit is for children, for example, who have bleeding from their intestine but we can't identify a source and it leads to them to develop anaemia over time," he adds.

Up to now, such cases, about two to five a year, have had to be sent to the UK under the treatment abroad scheme.

Although the administration of the capsule is very quick, the challenge on the medical side is that "you have to look at eight hours of video for every one patient".

Although they can speed the video up, staff have to be careful not to miss anything. Because the video footage will be examined by two people, as is best practice, it will take up a significant amount of nursing and consultant time, Hussey points out.

"This is not something you can do in an open-plan office because you can't be distracted," he says.

Down the line, he looks forward to the use of artificial intelligence to enhance interpretation of recordings.

"If you can get a software that will pre-screen your eight hours of footage and say that 'you have to look at these 20 minutes, the rest looks normal'. Now it is not there yet, so it hasn't beaten the human eye, but within a number of years I can see that's where we will be moving."

(Coincidentally, within 24 hours of Hussey's comment, the Mater hospital announced it had become the first hospital in Ireland to use AI-assisted software across its radiology department on patient scans, to accelerate emergency care. By rapidly flagging anomalies, the software enables radiologists to prioritise the reading of those results and verify their accuracy before deciding on the next step.)

A capsule endoscopy does not allow for a biopsy that would be done routinely under the conventional method, so, depending on the case and what is found, this may have to be done as a follow up. For now, Hussey adds, the new technology will only be available for patients referred within the hospital and is not set up to be an open-access, GP direct-referral service.

The incidence of inflammatory bowel disease in children has doubled every decade in recent times. About 160 new cases were diagnosed at Crumlin in 2023, whereas in 2001 there were just 35 new cases. Hussey is leading a research study, Dochas, to look at possible factors associated with this increase and also at outcomes of treatment.

Meanwhile, the O'Neills can expect results of the capsule endoscopy to be reported to them within a fortnight. One small swallow for a boy today should prove to be a giant leap for future paediatric patients.