



Emmanuel Teiger

## Optimising coronary patients' treatment pathway using ambulatory percutaneous coronary intervention

Advances in percutaneous coronary intervention (PCI) have reduced post-procedure complications for patients with coronary disease, but inpatient treatment is still used as the standard of care. Professor Emmanuel Teiger of the Henri-Mondor Hospital, Créteil, France, spoke with *Confluence* to discuss the clinical implications of using PCI on an ambulatory basis, and how this treatment pathway can be used to optimise medical resources while maintaining patient safety.

What is ambulatory percutaneous coronary intervention (PCI)?

**Professor Emmanuel Teiger (ET):** PCI is a non-surgical technique used to widen narrow or blocked vessels for the treatment of patients with coronary artery disease.<sup>1</sup> The procedure traditionally requires an overnight stay in hospital following intervention, but patients can also be treated on an ambulatory basis, whereby they are discharged on the same day as the procedure.

Nowadays, the ambulatory approach is becoming a relatively standard process, but 10 years ago it was not as evident that this treatment pathway could be applied to a cardiology setting. Patients were kept overnight in hospitals despite a lack of clinical complications, so we questioned the viability of discharging patients on the same day as the intervention. At our centre, we have been treating patients using PCI on an ambulatory basis since 2006. Patients arrive at the centre in



the early morning, at around 8 am, and are able to leave the hospital by 5 pm on the same day. We aim to finish the procedures before 1 or 2 pm to allow an observation period of at least 4 hours after intervention. We have now treated over 2,000 patients using ambulatory care and it is regular practice for us to have up to four or five patients per day who only require 1-day hospitalisation.

#### What has current clinical evidence shown?

**ET:** We conducted a multicentre trial to evaluate the safety and efficacy of ambulatory PCI under conditions of everyday practice.<sup>2</sup> The number of patients that required re-hospitalisation within 24 hours of intervention was used as a primary endpoint and we also recorded the development of adverse complications or cases of re-hospitalisation. Patients with coronary disease were referred to one of three high-volume angioplasty centres. Over 96% of the patients treated with PCI were cleared for discharge on the same day as intervention, following an observation period of 4–6 hours.<sup>2</sup> We found that no patients required re-hospitalisation or experienced local complications within 24 hours after leaving the hospital, so the strategy of ambulatory PCI was determined as very safe and effective.<sup>2</sup> These low rates of major complications from ambulatory PCI have been further confirmed by a meta-analysis evaluating data from 12,803 patients included in randomised, controlled trials and observational studies.<sup>3</sup> In selected populations undergoing PCI, same-day discharge appears to be as safe as routine overnight observation.

#### How can you increase the safety of ambulatory care?

**ET:** We first identify which patients are eligible for ambulatory care. The patient should preferably live within 30–40 minutes of the hospital by car and should also not be left alone during the night following the PCI procedure. This is a precautionary measure for any instance where re-hospitalisation would be necessary, and we regard this as very critical inclusion criteria for our centre. Any prospective ambulatory patient has to remain at the hospital if they are unable to have someone with them directly following the intervention. The next consideration is selection of the most appropriate patients from the eligible population. At my centre, we perform angiocardiology and adopt PCI at the same time. However, if you select

the patients in two steps, where you first perform an angiodiagnosis and then select the patient for either standard or ambulatory PCI in the secondary stage, you can improve the rate of patients effectively discharged from the hospital on the day of the procedure.

To improve safety during the procedure, around 97% of interventions in our study were performed using radial access, rather than the transfemoral approach. The transradial approach has emerged as an excellent alternative to transfemoral, due to its clear association with fewer access-site complications, as well as allowing early ambulation.<sup>4</sup> There are two rounds of evaluation before a patient is deemed safe to leave the hospital. The first is immediately after the procedure; if any complication has been observed during PCI, such as bleeding complications or occlusions of the secondary coronary branch of the artery, the patient is automatically excluded from ambulatory care. The second evaluation is after 4 hours of observation post-procedure. The physician in charge of the 1-day hospitalisation has the final approval, which is dependent on the presence of complications such as chest pain, haematoma, dissection of the artery or modification of the ECG. Complications, no matter how big or small, are the main reason for keeping patients in the hospital overnight. Additionally, you find that around 8% of patients may not want to leave the hospital. Despite this, the rate of discharge observed in observational studies suggests that around 65% of patients are able to leave hospital on the same day as treatment.<sup>3</sup>

In terms of the follow-up protocol, we call the patient the day after the procedure to perform a laboratory test at home for evaluating cardiac markers and also the creatinine table, which is obligatory in Paris. We also include for some patients a secondary 1-day hospitalisation unit dedicated to the evaluation of risk factors and patient education. Over the years, we have found that if we respect our criteria of not discharging patients where complications are present during the procedure or the observation period, ambulatory PCI is very safe. We have never experienced severe problems with any of the 2,000 patients that we have discharged, and since 2006 we have only re-hospitalised two patients within the 24 hours after discharge. In both cases,

the patients were re-hospitalised for observation only, without any need for new angiography or PCI.

### How do patients treated with PCI respond to ambulatory care?

**ET:** In terms of patient satisfaction, we have received a very high level of positive feedback from the questionnaires given in our study. Although some patients chose to remain in hospital after treatment, over 90% of patients preferred being able to leave the hospital on the same day as PCI was performed.<sup>2</sup> For a relatively simple intervention, people generally prefer being able to enjoy the comfort of their own homes after a successful procedure.

### How does ambulatory PCI impact hospitals?

**ET:** Ambulatory PCI means that patients can be discharged on the same day as the intervention, which provides the hospital with more beds to receive emergency patients, for example, so you can actually increase the overall number of patients that you are able to treat by having a higher rotation. For the physician referring the patient, there is a very short time to accept the patient due to rotation and rate of activity. It is very important to ask if you can treat this patient tomorrow, or within 2 days, and use this information to optimise bed occupation and reduce the delay of patient hospitalisation. Therefore, we can normally increase the number of patients that we are able to treat both with 1-day hospitalisation, as well as in the standard hospitalisation unit. This is an interesting point for financial structures, such as in our centre where there is high volume of patients relative to the amount of resources available; increasing our patient turnover by 20–25% without having to increase the number of nurses, for example, is a very efficient way to optimise the use of medical resources.

### What are the challenges to implementing ambulatory PCI?

**ET:** For the reimbursement procedure in France, if a hospital wants to receive the full amount of money for a patient, the patient should spend at least 2 nights in care – arriving at the hospital the day before the procedure and leaving on the day after intervention. As the duration of hospitalisation is less than 2 nights with ambulatory PCI, as much as 25–35% of this income can be lost.<sup>2</sup> In France,

this issue is currently being discussed with health authorities. If the trend for health authorities is to develop, improve and increase ambulatory care, it is important that cardiology is a part of this general process. It is also important to note that these financial implications have to be integrated into wider considerations, including the potential improvements in the utilisation of medical resources, as well as the efficiency of the cardiology department. Overall, the cost evaluation showed that ambulatory PCI was associated with cost savings related to both the absence of an overnight stay and the low rate of emergency readmissions. I expect that if the modality of reimbursement for ambulatory purposes is changed in France, a lot more colleagues will adapt their practice to incorporate ambulatory treatment for PCI.

### Are there any hospitals or treatment centres where you think this approach would be less suited?

**ET:** No, I think all hospitals are able to develop this approach. However, ambulatory PCI is probably more adapted to urban areas where the patient lives in closer vicinity to the treatment centre. It is important to have this relatively short distance in case a patient has to be re-hospitalised overnight; however, we have never had to re-hospitalise at our centre. Within our inclusion criteria, there is both the question of distance and the question of time for the patient to come back to the hospital. We put 30 to 40 minutes away from the centre as our inclusion criteria for Paris, as the city is very dense. In a more rural region, it may be more realistic to have a limit of 1 or 2 hours. Additionally, it is important to highlight that not all centres are able to apply angiodiagnosis and PCI in two separate steps for better patient selection. However, in our centre, where angiocardiology and PCI are performed at the same time, we are still able to send home 65% of patients on the same day as the intervention. So for me, ambulatory PCI should be possible for all medical centres that perform PCI.

### What role can ambulatory PCI play in building a 'value-based' healthcare system?

**ET:** The ambulatory programme should be integrated into the cardiology department, and patients managed by a dedicated and highly-specialised team. All the workflow is oriented to fit with the patient constraints and to provide care that is as safe as in usual hospitalisation, but with

a shorter stay in the hospital. The development of this approach in a cardiology department is an opportunity to structure a procedure-based practice and optimise the use of medical resources.

### How is ambulatory PCI being adopted in Europe?

**ET:** The number of patients being treated using this pathway is increasing in Europe, and I think that ambulatory PCI will become standard practice very soon. There still remain questions around organisation, as well as the modality of reimbursement for ambulatory care in France, but a lot of centres are very interested in developing this approach because they want to optimise their medical resources and increase their activity.

In Europe, the number of patients treated using ambulatory PCI will likely increase. I expect that 20–25% of all PCI procedures will be performed on an ambulatory basis in all cardiology departments in France within the next 4 to 5 years. In high-volume centres, the shorter hospital stay may increase patient turnover and the number of procedures. In other centres, the increase in hospital bed availability might allow the development of other interventional cardiology activities. Overall, ambulatory PCI may hold promise for optimising healthcare resource utilisation. There a lot of institutions in places such as the Netherlands and Germany that are already using the technique. Accompanied with the radial approach, the new generation of drug-eluting stents, pharmacology and the development of antiplatelet drugs, the procedure is generally regarded as safe. It is the current trend to develop short hospitalisation times, so ambulatory intervention is a logical evolution of PCI.

### How can greater adoption of ambulatory PCI be encouraged?

**ET:** I have practiced this treatment pathway for more than 10 years, and there is now enough evidence to support that the radial approach to ambulatory PCI, accompanied with a good selection of patients, yields strong result in terms of safety and feasibility. My colleagues who come to our hospital often question how the activity is organised. Physicians want to know what the criteria are, how the patient is received and how the biological lab test is performed before doing a standard procedure. They need to visualise how they can develop something that is similar to a radial lounge in their own institution and how they can create a clear pathway for the patient to move through the waiting room, the cath lab and the observation period.

Changing the habits of practising physicians, as well as encouraging more support – including financial – for organisations should promote its adoption. For new centres, the practice of PCI on an ambulatory basis is becoming more routine. From the medical point of view, all criteria point towards an increased use of ambulatory PCI. The patient pathway is very well described, so it is the way that centres improve and adjust their internal organisation that will aid the development of ambulatory PCI in the coming years. The procedure offers a way to optimise medical resources and improve the number of patients that you are able to treat. If introduced step-by-step, physicians will be convinced by the ambulatory approach to care when tested for themselves. There is no place like home after a successful PCI!

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#### REFERENCES:

1. Ludman P. *Medicine* 2010;38:438–445.
2. Le Corvoisier P, et al. *Catheter Cardiovasc Interv* 2013;81:15–23.
3. Brayton KM, et al. *J Am Coll Cardiol* 2013;62:275–285.
4. Brueck M, et al. *JACC Cardiovasc Interv* 2009;2:1047–54.

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