Telesupported procedures: when and how

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Key Points
- Telesupport means guidance of a procedure performed at one location by another clinician at a different location.
- In a pilot study, 21 percutaneous coronary interventions and nine catheter ablations were successfully performed without complications with telesupport from a remote university hospital.
- Telesupport is a powerful tool that can be especially useful when urgent care is needed or when transfer is not an option, but it also has limitations, such as network failure or difficulties handling complications; judicious use is key to optimizing outcomes.

"With great power comes great responsibility."
Spider-man, written by Stan Lee.

Case 1: A 50-year-old man presents with anterior myocardial infarction at a small rural hospital. He is presented with two options: on-site percutaneous coronary intervention (PCI) within 30 min by a moderately experienced operator using telesupport or transfer to a larger hospital that will require 90–120 min. He chooses the first option and undergoes successful PCI of the left anterior descending artery. ST segments immediately normalize, and he is discharged 2 days later with mild anterior hypokinesis.

Case 2: The same 50-year-old man described above undergoes on-site PCI with telesupport. Left main dissection occurs, resulting in cardiac arrest. There is no cardiac surgery on-site. The patient dies while being transported.

Case 3: The same 50-year-old man presents at the small local hospital during a coronavirus outbreak. Transfers are not allowed to or from another hospital outside the outbreak zone due to lockdown. He is given the option of telesupported PCI or lytic therapy.

In this issue of the Journal, Adachi et al. describe a telesupport system for performing PCI and catheter ablation at Kamisu, a small city located approximately 1 hr away for the tertiary University of Tsukuba. Bidirectional communication was established over a secure network, enabling successful completion of 21 PCI cases (2 in the setting of STEMI) and nine catheter ablations over 10 months without complications.

1 | TELESUPPORTED PROCEDURES: WHEN?

The strongest reason for telesupported procedures is when treatment is urgently needed to prevent irreversible patient injury, and no other options exist (Figure 1). Case 3 illustrates such a scenario. Another example is the need for procedures in airplane carriers or during space expeditions. The first telesupported procedure performed was a laparoscopic hemia repair on an aircraft carrier. The second strongest indication is when early treatment may be advantageous to patient transfer, such as in STEMI. The third and weakest indication is convenience, that is, patients in Kamisu not willing to travel 1 hr to Tsukuba for an elective procedure. Another application of telesupported procedures is for training (even experienced) operators to perform new procedures or modifications of existing procedures.

2 | TELESUPPORTED PROCEDURES: HOW?

There are different potential levels of telesupport. Sharing images, annotating them, and speaking to each other are one level that was used successfully in the present report. A more advanced level would be for the main center operator to perform the procedure in the remote location using a local "robot." Although the currently available system (Corindus, Siemens Healthcare, USA) can help with wiring and balloon/stent delivery, it cannot perform all PCI steps, requiring an operator at the supported site to obtain arterial access, engage the coronary arteries, and load equipment on the robot.

3 | TELESUPPORTED PROCEDURES: THE GOOD AND THE BAD

Telesupported procedures have obvious advantages (prompt treatment without the need for patient transfer) but also disadvantages.
Safety concerns are at the top of the list: what if a complication happens (Case 2 above)? Or what if all the necessary equipment is not available locally, and the procedure needs to be abandoned? What if the network fails during a critical part of the procedure? Or if the network is hacked and the local operators are misled into inappropriate actions? What if the main hospital operator is tied up in an emergency and cannot provide support? Are two PCIs per month (average PCI number in the present report) enough for the local operator to maintain competence? The 21 cases described in the present report are too few to confirm safety.

4 | TELESUPPORTED PROCEDURES: IMPROVING SAFETY

Several measures can be taken to minimize the risk of telesupported procedures: First, the local operators should have had full training and should probably rotate periodically to the major hospital to maintain competency. Second, intravascular imaging could help optimize the safety of PCI. Third, well-thought-off plans should exist for approaching various complications and for transferring patients, if needed. Frequent practice drills would help ensure that those plans will be operational when needed. Fourth, complex cases should be avoided, if possible. Fifth, large equipment selection should be available and restocked immediately upon use. Sixth, backup communication options should be available in case of network failure. Seventh, backup cardiologists should be available at the main site.

5 | TELESUPPORTED PROCEDURES: FINAL THOUGHTS

Procedural telesupport is here to stay and will undoubtedly improve over time. Telesupport can provide significant power, but as with all great powers, responsible use is essential! Understanding its strengths and limitations can help optimize outcomes as illustrated in Case 1 and minimize risks as shown in Case 2. Most
patients would probably opt for telesupported PCI in the case of STEMI. However, most may be best served by undergoing their elective procedure at a tertiary center, especially if that procedure is complex.

Last but not least, procedural telesupport may transform initial and continuing medical education. If widely available and at low cost, who would not want to have telesupport even for standard procedures?! Obtaining a second opinion live can facilitate optimal decision making and help with complication troubleshooting. Telesupport could have a dramatic impact on the treatment of complex lesions subsets, such as bifurcations and chronic total occlusions. Patients and clinicians are eagerly awaiting!

CONFLICT OF INTEREST
Dr. Megaly: none. Dr. Brilakis: consulting/speaker honoraria from Abbott Vascular, American Heart Association (associate editor Circulation), Biotronik, Boston Scientific, Cardiovascular Innovations Foundation (Board of Directors), CSI, Elsevier, GE Healthcare, InfraRedx, Medtronic, and Teleflex and research support from Regeneron and Siemens. Shareholder: MHI Ventures.

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