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EDITORIAL COMMENT

Live Case Demonstration of Interventional Cardiology Procedures

A Regulatory Perspective*

Andrew Farb, MD, Bram Zuckerman, MD

Silver Spring, Maryland

Medical science progress requires a strong educational foundation, and the direct demonstration of knowledge and skills has been a traditional teaching method for practitioners. Advances in communication technology have provided unprecedented opportunities to show patient care in real time. As a result, there has been proliferation of live case presentations to audiences attending professional society conferences and worldwide via the Internet.

Despite the popularity of live cases, their educational value is uncertain and difficult to measure. There are associated medical ethics issues, the most important being whether participation in a live case is in a patient's best interest. Critics of live cases point to their "entertainment" quality. Further, concerns have been raised that live cases may be associated with increased patient safety risks. In addition, patient confidentiality may be inadvertently compromised during the broadcast.

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Professional society groups representing thoracic surgeons and cardiologists have each published position papers on live cases. Citing important safety risks against limited educational benefits, 2 thoracic surgery societies recommended that live surgery broadcasts should be prohibited at their professional society meetings (1). In contrast, a consortium of cardiovascular professional societies emphasized the benefits live cases, including physician education, improved medical care, promotion of clinical trials, and medical device innovation (2). To address issues regarding patient safety, informed consent, and conflict of interest, they proposed a program of standard operating procedures designed to lower patient risks and enhance educational value (2).

A major obstacle to understanding the risks associated with live cases is the paucity of clinical study data (3,4). In this issue of *JACC: Cardiovascular Interventions,* Eliyahu et al. (5) provide important new information regarding live broadcasts of interventional cardiology procedures. They reviewed 101 live interventional cardiovascular cases performed between 1998 and 2010. The format consisted of 1 or more operators discussing the procedure with an off-site expert panel. The complete procedural success rate was 83%. With regard to safety, the major complication rate was 2% (2 of 101 cases). However, among the procedural complications that were considered "minor" were 3 cases of ventricular fibrillation, 1 case of guidewire-induced coronary perforation, 2 access site bleeds, and 1 case of pericardial tamponade. The authors compared outcomes to a case-matched control group; there were no statistically significant differences in the procedural success and complications rates. However, confidence intervals were quite wide, and the study was a retrospective analysis of a very select single-center registry.

The FDA Perspective

The broad regulatory mission of the U.S. Food and Drug Administration (FDA) is to promote and protect public health, and the role of the FDA's Center for Devices and Radiologic Health is to ensure the safety and effectiveness of medical devices. Once a device is FDA approved, it may used by a physician for its approved indication or outside of its approved indication (known as off-label use) as part of the "practice of medicine," which is not regulated by the FDA. Therefore, with regard to live cases, the FDA's major regulatory oversight is on the use of investigational, non-FDA-approved devices, which are undergoing evaluation in an ongoing FDA-approved investigational device exemption (IDE) study. An IDE allows the use of investigational devices in a clinical study, which is often designed to collect safety and effectiveness data to support marketing in the United States.

The FDA defines a live case presentation as: "Treatment of a human subject under the auspices of an approved or conditionally approved IDE, conducted and broadcast in real time, or taped for broadcast at a later time." The FDA is developing a guidance document on live case presentations performed during IDE studies.

To use an investigational device in a live case presentation, a sponsor must request approval from the FDA. Because an investigational device often may only be available for use in an ongoing IDE study (i.e., it is not available

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From the Office of Device Evaluation, Center for Devices and Radiological Health, U.S. Food and Drug Administration, Silver Spring, Maryland. This work represents the professional opinion of the authors and is not an official document, agency guidance, or policy of the United States government, the Department of Health and Human Services, or the Food and Drug Administration, nor should any official endorsement be inferred. The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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to all U.S. physicians and patients), and may potentially never be FDA-approved for general use, the use of an investigational device in a live case is justified in limited circumstances. The FDA will permit the use of an investigational device in a live case to increase awareness of the IDE study for investigators and potential investigators and to facilitate the recruitment of subjects. These criteria are consistent with the FDA's objective to facilitate the timely completion of clinical studies to capture safety and effectiveness data needed for FDA approval that results in the availability of beneficial devices for U.S. patients. A investigational device being used in an IDE study that is rapidly enrolling or nearing complete enrollment would not be appropriate for a live case presentation; live case use in these circumstances would be viewed as essentially promotional in nature. During live case demonstrations, the devices should be clearly identified as investigational, and comments by operators and panel members, in addition to ancillary presentation materials, should not be used for commercial promotion of the device.

In the evaluation of an application for a live case demonstration of an investigational device, the FDA focuses its review on 3 critical patient protection components: 1) Institutional Review Board approval; 2) a comprehensive risk analysis and risk mitigation strategy; and 3) the informed consent document.

By definition, the safety and effectiveness of an investigational device has not been established, and study patients consent to enrollment even though all risks are not completely known. The application for a live case demonstration of an investigational device must include a comprehensive discussion of potential risks beyond the risks of the study device and procedure. Potential concerns may include increased risk of infection; prolongation of the procedure leading to increased anesthesia, contrast use, and radiation exposure; distraction of the operator leading to complications; and disclosure of the patient's privileged information. The application should include patient-protection measures that mitigate those risks as much as possible. These may consist of live procedures performed by highly experienced operators at their home institutions, use of study sites familiar with live cases, and the use of an on-site discussant (rather than the primary operator) that interacts with the off-site panel. A live case–specific informed consent is required that includes language on risks. Patients should also be informed that they should expect no additional clinical benefit from their participation in a live case.

For IDE studies, patient participation in live cases cannot come at the expense of study integrity or the interpretability of study data. Subjects in live cases "count" toward total number of patients permitted, and the outcomes of these subjects are considered in the analysis of study results. Sponsors who anticipate live cases should account for these subjects in the total sample size of the study. To preserve the study's scientific validity, live case patients must fulfill the same inclusion/exclusion criteria and must be treated and followed in the same manner (including adjunctive standard-of-care treatments) as all nonlive case subjects. Live case participants need to be pre-selected, but identification of appropriate patients must not result in selection bias. The potential effect of pre-selection on study parameters, such as randomization and blinding (where applicable), needs to be considered. In some cases, it may be appropriate to exclude data from live cases from the primary study analysis. Sponsors are required to submit reports to the FDA that detail clinical results of live cases and compare outcomes in live case subjects to the nonlive case study population.

The FDA does not regulate the use of approved medical devices in live case demonstrations. However, similar to live case presentations of investigational devices, use of approved devices in live cases should not be for commercial promotion. An additional concern is that the presentation could be interpreted as endorsing off-label use of a product. Any off-label use of a device should be clearly identified during the live case, and the FDA has the authority to take disciplinary action for commercial promotion of off-label use of a medical device.

Some procedures (e.g., extremely high-risk procedures or compassionate use procedures) are not appropriate for live case presentations of investigational devices. Further, live cases using investigational devices in children require additional considerations. Because technical challenges and procedural risks are likely to be higher in children than in adults, and there is no expectation of direct benefit by participation, live cases in children should be limited to those that present no more than minimal risk.

The Center for Devices and Radiologic Health does not regulate the use of investigational devices used in live cases performed at non-U.S. sites and broadcast to a conference within the United States. In these circumstances, sponsors follow the regulations applicable to the country in which the live case is being performed. However, the FDA recommends that all live cases, irrespective of where they are conducted, apply high standards of medical ethics and incorporate essential patient-protection measures (risk analysis, risk mitigation, and informed consent).

Conclusions

The study by Eliyahu et al. (5) provides some reassurance that live case presentations of interventional cardiology procedures do not appear to be associated with significantly increased risks to patients. However, data are quite limited, and further studies are warranted. An international registry of prospectively collected data from live cases presented at major interventional cardiology meetings would greatly enhance our understanding of risks and could lead to additional measures to reduce those risks. In addition, establishment of the educational value of live cases, though challenging to assess, would support their presumed benefit to medical care.

For investigational devices, the FDA will continue its important regulatory role to ensure that all live cases using investigational devices are appropriately selected to aid in the completion of an IDE study, are nonpromotional, and address and mitigate potential risks to patients.

Reprint requests and correspondence: Dr. Andrew Farb, Office of Device Evaluation, Center for Devices and Radiological Health, U.S. Food and Drug Administration, 10903 New Hampshire Avenue, WO66-1116, Silver Spring, Maryland 20993-0002. E-mail: andrew.farb@fda.hhs.gov.

REFERENCES

1. Sade RM, American Association for Thoracic Surgery Ethics Committee, Society of Thoracic Surgeons Standards and Ethics Committee for the American Association for Thoracic Surgery Ethics Committee and the Society of Thoracic Surgeons Standards and Ethics Committee. Broadcast of surgical procedures as a teaching instrument in cardiothoracic surgery. Ann Thorac Surg 2008;86:357–61.
2. Dehmer GJ, Douglas JS, Abizaid A, et al. SCAI/ACCF/HRS/ESC/SOLACI/APSIC statement on the use of live case demonstrations at cardiology meetings: assessments of the past and standards for the future. J Am Coll Cardiol 2010;56:1267–82.
3. Chatelain P, Meier B, de la Serna F, et al. Success of coronary angioplasty as seen at demonstrations of procedure. Lancet 1992;340:1202–5.
4. Franke J, Reimers B, Scarpa M, et al. Complications of carotid stenting during live transmissions. J Am Coll Cardiol Intv 2009;2:887–91.
5. Eliyahu S, Roguin A, Kerner A, et al. Patient safety and outcomes from live case demonstrations of interventional cardiology procedures. J Am Coll Cardiol Intv 2012;5:215–24.

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