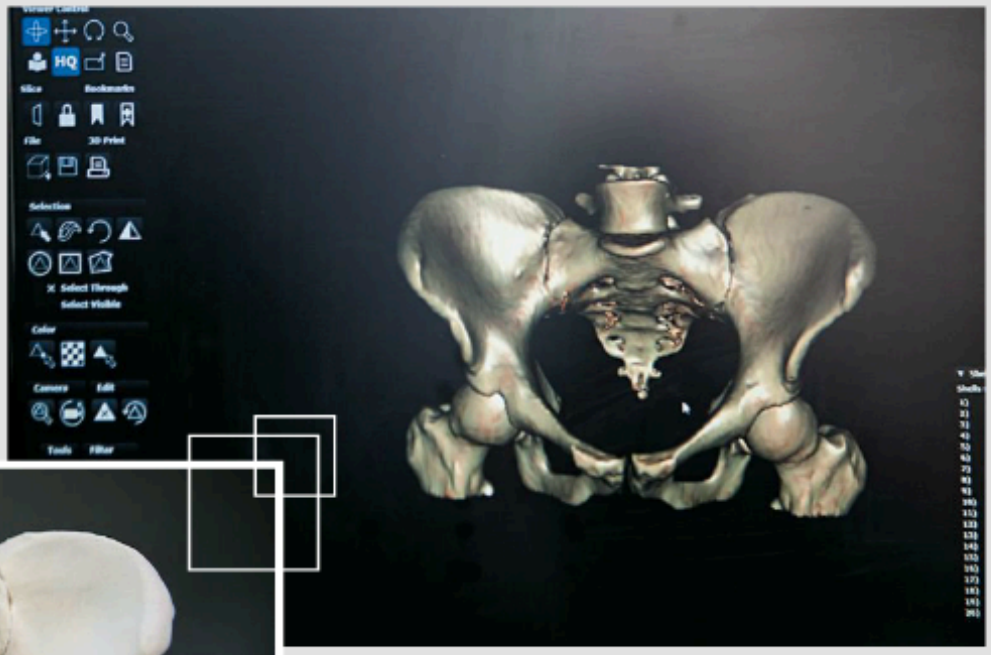
3-D PRINTING



A 3-D printed model of a crucial piece of evidence can enhance your case presentation and help jurors understand the harm to your client.

By || Randall Scarlett, Charles Monnett, and Bob Shepherd

Melvin M. Belli Sr. once said: "Try a case in a humdrum manner, and expect a humdrum result." That statement was true in 1980, and today, it may be an understatement. Jurors remember more of what they hear and see, rather than what they hear alone. What if a juror could also touch a crucial piece of evidence? Enter the use of 3-D printing in the courtroom. 3-D printing involves creating a 3-D physical model from a 3-D digital model. 3-D printing used to be cost prohibitive, but recent technological advances have made this method of evidence presentation more affordable. In the right case—for example, if a particular type of fracture is contested—this powerful demonstrative tool can destroy defense arguments. Unlike a two-dimensional board or a projected picture, jurors can hold, see, and feel the actual 3-D model.

Two of the authors used 3-D printing in a failure-to-diagnose case, creating a life-size replica of an injured child's skull, which was essential to the case's successful outcome. A one-year-old child was admitted to a hospital after sustaining multiple skull fractures in an accident at home. While in the hospital, the child contracted bacterial meningitis.

A key issue in the case was whether the child's skull fractures increased the risk of infection, and whether the doctors should have recognized this risk. The plaintiffs contended that the child contracted meningitis from direct contamination of the meninges—the protective tissue around the brain and spinal cord—and cerebrospinal fluid through the skull fractures. The defendants disputed this, arguing that the child did not have fractures in the base of the skull—known as basilar skull fractures—and therefore, was at no higher risk for contracting meningitis. The defendants argued that a respiratory infection that

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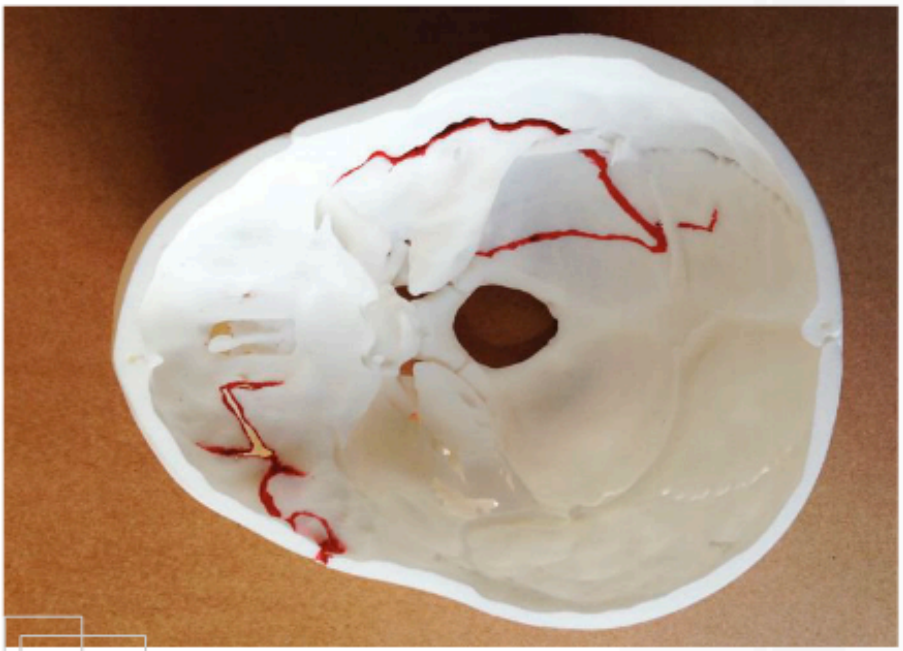
spread to the child's bloodstream caused the meningitis.

The source of the infection was necessary to establish the defendants' liability: If they could prove the infection began somewhere other than the brain, it would alter the plaintiffs' timeline for the onset of the meningitis.

During trial preparation, the plaintiffs' counsel and experts carefully evaluated the initial CT scans. It was clear that some of the skull fractures were basilar fractures. The CT scans also showed that one of the fracture lines opened a path from the mastoid air cells—a source of bacteria—to the meninges and brain. One scan slice revealed a small air bubble within the skull, which was a strong indicator that air and fluids, probably laden with bacteria, had entered the skull at a fracture site. From there, the bacteria could multiply unchecked, leading to cerebral meningitis.

The trial team developed 2-D prints of the best individual scans of the fractures, along with corresponding illustrations that more clearly showed the relevant anatomy and pathology. They also used the CT scans to create a digital 3-D reconstruction video. This video helped the jurors better appreciate the nature and location of the fractures, and how the skull fractures put the child at an increased risk of developing meningitis.

The plaintiffs' team also considered multiple options for a 3-D printed model of the skull. One option was to create a "larger-than-life" skull, but they chose an actual life-size printed model, primarily to strengthen the model's accuracy and authenticity. The 3-D printed model of the skull was used multiple times throughout the trial, and it was particularly helpful in cross-examining the defendants' experts. The model helped refute their claims that there were no basilar skull fractures that would increase the risk of the child developing meningitis. The jurors could see, feel, and touch the skull for themselves. The location of the fractures became so obvious that it was no longer a battle of words. The jurors were more engaged when the evidence was presented in different formats that required various senses.



By presenting the evidence in different formats, more of the jurors' senses were activated, resulting in increased attention and learning.

Admissibility of the 3-D printed skull model was straightforward. The witnesses involved in developing the 3-D printed model executed an affidavit that summarized the processes involved—the reconversion of the child's actual CT scan or MRI data back into a three-dimensional object. The finished product was a true and accurate life-size depiction of the child's skull, including the fractures, as it existed when the scan was taken. The affidavit, along with the original CT scans, were provided to the plaintiffs' experts, who were then able to testify that the model was a fair and accurate depiction of the child's skull as it existed at the time the scans were taken. There are different ways to achieve admissibility. An alternative method would be calling the creators of the model itself to properly lay the foundation.

But presenting the 3-D printed model at trial is only part of the process—there are choices to make when designing the model and selecting a printer. 3-D printers range from a few hundred dollars for the home hobbyist to hundreds of thousands of dollars for scientific and industrial applications. Each technological process and printer has strengths and weaknesses, and there are several factors to consider when choosing the specific technology and printer for a project.

Think about the size of the model and

the detail required—does the model need sharp, crisp angles and edges? Another consideration is the material used for printing; some printers will only allow models to be made of specific materials, such as plastic or carbon fiber. Others allow models to be made of multiple materials or multiple colors of the same material at the same time.

Very fine structures are particularly challenging for some printers. The best technologies provide support for printing delicate structures with a powder that can be removed or a water-soluble support structure that prints with the primary structure and can be dissolved later. As is usually the case, the more advanced and sophisticated the printing process required, the higher the overall cost.

Before a 3-D printed model can be made, a digital model must first be created. This can be done with a 3-D modeling software program, scanning a physical model through the 3-D printer, or from the patient's specific CT scan or MRI data.

The potential uses for 3-D printing in personal injury and products liability trials are limitless. Larger than life-size 3-D prints of medical devices and other small structures can be created so that jurors appreciate small details. 3-D prints can also be used to create smaller-scale models of large machines, vehicles, or even buildings that would otherwise be too large for the courtroom. Or, like the skull in the meningitis case, 3-D printed models can be made exactly to scale and specific to your client's injuries. The judicious use of this technology can have a significant impact on juror learning and persuasion. There is no substitute for allowing jurors to hear, see, and touch the evidence. ■

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