Play-dough assisted coverglass drilling to make tiny access ports through cranial windows

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Summary: Roome and Kuhn described an elegant way of making a port in cranial window (Front. Cell Neurosci., 2014). However, the port in their method is too large (1.5 mm diameter in 5 mm cranial window). It is desirable to make smaller port to reduce the exposure of intact tissue underneath to external environment. Also the making method is not sufficiently accessible and reliable. Therefore, to address these two problems, I introduced here a more convenient and economical way of creating a tiny port in a thin glass coverglass to serve as the port for access to tissue under the window.

Procedure: The essential part of our method is to use modeling compound to spread the force generated during the drilling process for prevention of cracking. This is achieved by tight contact of coverglass with the play dough, which can be replaced with other modeling compound with similar properties as well. The whole procedure is described in **Fig. 1**, which takes only a few minutes. Care should be taken during the drilling not to press too hard. It is possible in theory to achieve even smaller hole by using smaller diamond drill bits. Another way to make smaller holes is to thin the glass from both sides in a very careful way followed by poking the hole through with a sharp syringe needle tip. The diameter of the hole can then be controlled by the poking extent.

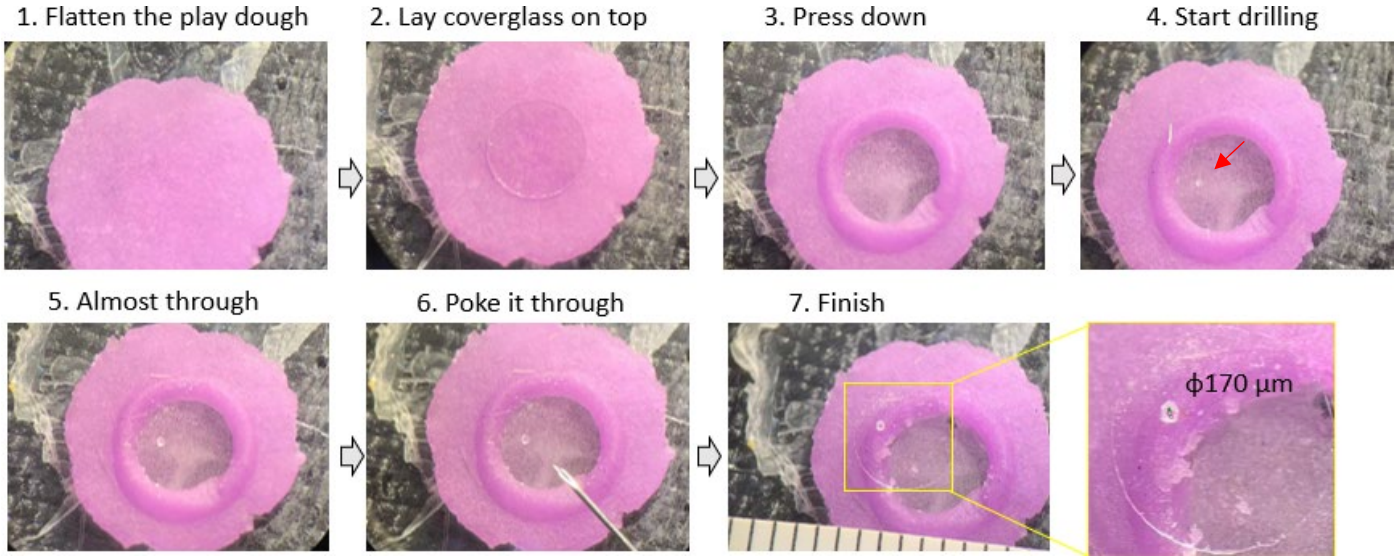

Figure 1. How to drill a small hole (<200 μm in diameter) through a thin coverglass.

Bill of Materials:

Coverglass	#1 coverglass (150 μm in thickness) is usually used for cranial window based optical imaging. Choose dimensions that suits your needs. In our case, we ordered round coverglass from Warner (5mm, 64-0700; 3.5 mm, 64-0739)
Drill	Any drill for high-speed drilling (38000 rpm). In our case, we used RWD 78001 Microdrill.
Drill bits	It is important to use diamond drill. This is the smallest drill bit available till the composition of this method. JINGLING 0.4mm Diamond Hole Saw Cylindrical Head Grinding Drill Bits Lapidary Tools for Stone from Amazon.
Play dough	Available from local grocery.