Select a polygon feature with a ring
Use the node tool to select the ring vertices and delete them
You get in the messagebar: "Geometry has been cleared. Use the add part tool to set geometry for this feature." which is a wrong
message given that there's still a geometry attached to the feature. This also occurs when a part of a multi-part geometry is deleted with
node tool.
Note that using the dedicated "delete ring" or "delete part" tools do not trigger this message.

This message should be shown only when there's no more geometry attached to the feature.

Only master is concerned given that it looks impossible to remove all the vertices of a ring or a part (unless it's a single part feature) in
2.18

This one is a bit weird :-) I can see a bug in the code, but fixing that bug will essentially disable the possibility to remove rings in vertex tool. There are some
more bugs inside, so e.g. if I have a polygon with three holes, and select vertices of one hole and delete them, it will actually delete two holes. Vertex
deletion is simply not very well handled by the core geometry classes and would need a bit of a rework...

Please check if this issue is still valid on QGIS 3.4.5 or 3.6.