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Outcomes from a multinational randomised controlled trial comparing normothermic machine perfusion with static cold storage in human liver transplantation

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Introduction:

By perfusing a liver with oxygenated blood, medications and nutrients at 37°C, normothermic machine perfusion (NMP) may improve outcomes after liver transplantation when compared with conventional static cold storage (SCS). We present the first randomised controlled trial (RCT) comparing continuous NMP with SCS in human liver transplantation.

Methods:

This multinational RCT was initiated by the Consortium for Organ Preservation in Europe (COPE) and involved seven European transplant centres. Adult DBD and type III DCD livers were randomly assigned (1:1) to continuous NMP or SCS. The primary end point was the difference in peak-AST, requiring 220 transplants (90% power). Secondary endpoints included: organ utilisation, preservation time, early allograft dysfunction (EAD), six month graft and patient survival and ischaemic cholangiopathy on MRCP.

Results:

272 livers (135 SCS, 137 NMP) were enrolled, consisting of 194 DBD and 78 DCD organs. 48 livers were discarded (32 SCS (15 DBD, 17 DCD) vs 16 NMP (10 DBD, 6 DCD); $p=0.01$), with two others declined but then transplanted by non-trial sites. NMP livers experienced significantly longer preservation times than SCS (7hr 21min vs 11hr 39min; $p<0.01$). Despite this, better early graft function was observed in the NMP group with regards to peak AST (974 IU/L SCS vs 485IU/L NMP; $p<0.001$) and EAD (29.9% SCS vs 12.6% NMP; $p=0.002$) with the magnitude of these effects being greater for DCD organs ($p=0.02$).

Discussion:

NMP livers show better early graft function than SCS in terms of peak-AST and EAD, both of which are surrogates for long-term graft outcomes. This is despite better organ utilisation and longer preservation times in the NMP group. Six month outcomes (graft and patient survival and MRCP data) are currently being analysed and will be available at the time of the congress.