Extracorporeal shock wave lithotripsy for pancreatic duct stones in patients with chronic pancreatitis: Are we underutilizing a new technology?

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Summary

The progressive inflammatory nature of chronic pancreatitis and its sparse therapeutic toolbox remain obstacles in offering patients durable solutions for their symptoms. Obstruction of the main pancreatic duct by either strictures or stones represents a scenario worthy of therapeutic focus, as nearly all patients with pancreatitis eventually have intraductal stones. A more recent option for removal of main duct stones is extracorporeal shock wave lithotripsy (ESWL). In an effort to explore the role of ESWL in a Canadian setting, we evaluated our initial experience over an 8-year period (2011–2019).

Chronic pancreatitis is a challenging disease for patients and clinicians alike. Its progressive inflammatory nature and sparse therapeutic toolbox remain obstacles in offering patients durable solutions for their symptoms. Despite decades of treatment, we remain limited to directing our therapeutic endeavours toward the complications of pancreatitis, as opposed to many of the underlying causes. Patient symptoms include chronic debilitating pain, pancreatic exocrine and endocrine insufficiency and, on occasion, obstruction of the gastrointestinal and/or biliary tracts.[1]

Obstruction of the main pancreatic duct by either strictures or stones represents a scenario worthy of therapeutic focus. More specifically, raised upstream intraductal and parenchymal pressures lead to local ischemia and pain.[2,3] Luckily, removal of these ductal stones has been linked to lowered pressure, improved drainage and lessened pain. This is particularly relevant when considering that as many as half of all patients with chronic pancreatitis have main duct stones.[4] Furthermore, nearly all patients have intraductal stones within 14 years of onset of their disease.[4]

Options for removal of main duct stones include endoscopic retrograde cholangiopancreatography (ERCP) with stone extraction, ERCP with intraductal lithotripsy, surgical intervention (decompressive Peustow v. decompressive and resective Frey procedure) and, more recently, extracorporeal shock wave lithotripsy (ESWL). The latter appears to be particularly helpful in older patients with larger intraductal stones located in the head and neck of the gland.[5] Multiple studies have now confirmed that large proportions of patients treated with ESWL become pain free for substantial durations of time following this procedure. More specifically, a retrospective analysis of 5124 patients who were not amenable to endoscopy-based stone removal (i.e., ERCP) reported that 83% were pain free at 6 months.[6] These findings are also supported by other smaller unifocal series as well as data comparing ESWL to ERCP-based therapy (i.e., single-operator pancreatoscopy with intraductal [intracorporeal] lithotripsy [SOPIL]).[5,7] Additional comparisons between surgical and

endoscopic approaches have also shown that although surgical decompression results in improved long-term outcomes,[8] not all patients are amenable to surgery. Requirements for surgical candidacy include abstinence from alcohol and smoking; presence of a firm/hard pancreatic gland, as confirmed by preoperative radiologic evidence (calcifications and morphologic changes); presence of a large main duct; patient mental and physical engagement in the perioperative process; and a willingness to participate in postoperative narcotic reduction strategies. Given that many patients are also poor candidates for SOPIL (e.g., inability to cannulate the main pancreatic duct and/or remove subsequent stones/fragments), ESWL is a potentially attractive option. It must be highlighted, however, that mandatory requirements for pursuit of ESWL remain similar to those for surgical interventions (alcohol and smoking abstinence, ductal anatomy, glandular texture, patient participation).

Although ESWL appears safe for elderly patients,[9] post-ESWL pancreatitis remains an important risk and approximates the frequency observed in post-ERCP-based interventions.[10] It is also becoming clear that complete intraductal stone clearance following ESWL is essential to increase the likelihood of improved pain relief. More specifically, in a large systematic review and meta-analysis, confirmation of thorough ductal clearance was associated with more than half of all patients reporting a complete absence of postprocedural pain.[11] In a portion of patients, however, complete ductal clearance may also require post-ESWL endoscopic support (i.e., ERCP stone fragment extraction).[11–13]

Extracorporeal shock wave lithotripsy in a Canadian setting

In an effort to explore the role of ESWL in a Canadian setting, we evaluated our initial experience over an 8-year period (2011–2019). Among 32 patients (median age 58 yr, 53% female) with varying etiologies (56% idiopathic, 28% alcohol, 6% gallstone, 3% hereditary, 3% trauma, 3% other), 70% of patients described "little to no pain" at a mean follow-up interval of 22 months (pain was measured via visual analogue scale as well as exploration of its effect on return to work and performing normal daily activities). The dominant indication for the index intervention was recurrent and/or chronic abdominal pain (67%). Not surprisingly, 53% of patients had a single intraductal stone (mean size 9.6 mm) within the head or neck of the gland (70%). The upstream size of the dilated duct approximated 8 mm in all patients. Predictably, these patients had each been selected for ESWL because of noncandidacy for surgical intervention (refused surgical intervention, perceived inadequately firm gland, medical comorbidities). Furthermore, 77% had undergone preceding ERCP-based interventions that were felt to be inadequate in regard to intraductal stone clearance. As a result, the mean duration between presentation to the health care system and treatment with ESWL was 222 days. Interestingly, 90% of patients underwent a single ESWL session (2500–3000 shocks). One case of post-ESWL pancreatitis occurred. Among the patients who reported a recurrence of pain (31%), the average time interval to their relapse was 14 months. In the post-ESWL setting, 57% of patients required repeat ERCP fragment clearance and pancreatic duct drainage (stenting). It must also be noted that 22% of post-ESWL patients also went on to show glandular evolution that allowed a subsequent surgical procedure (Frey procedure) in the context of recurrent pain (mean interval of 47 months between ESWL and Frey procedure). Of this cohort, 5 of 7 patients experienced significant improvements in their pain scores in the postoperative setting. Overall, 23% of patients remained dependent on narcotics, 27% had exocrine insufficiency and 33% had diabetes (70% insulin therapy).

Discussion

Although we await the results of the SCHOKE trial evaluating combined ESWL and endoscopic therapies for chronic pancreatitis,[14] it is clear within our single-centre, retrospective Canadian experience that ESWL is a reasonable, and likely underutilized, treatment approach in select patients. More specifically, older patients with a single intraductal obstructing stone within the head/neck of their pancreas and associated chronic pancreatitis pain and who are ineligible for either surgical or isolated ERCP-based interventions may benefit from ESWL. In comparison to studies reporting the efficacy of ESWL,[5–7,9,11–13] we found that our patients showed a comparable "pain free" status (69%) and aligned well with the recommended indications and subsequent complications (i.e., pancreatitis). Although our analysis was limited by very narrow selection criteria (as discussed above), and therefore selection bias, we cannot comment on the utility of ESWL in less restricted patient populations with chronic pancreatitis. It must also be remembered that ESWL is only a single tool in a (relatively) limited armamentarium to treat select patients with chronic pancreatitis-related pain. It should also be highlighted that patient follow-up was not perfect (patients were evaluated quarterly by the surgeon for a mean of 18 months, as well as tracked by a province-wide population-based electronic medical record). Critical principles for patient success include achieving complete main duct stone clearance (with or without adjunctive procedures), monitoring for immediate post-ESWL pancreatitis and ensuring long-term patient follow-up.

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