The Clinical Use of Probiotics and Fibre

Post-operative infection in surgery

One of the most significant discoveries in the use of probiotics has been the reduction of hospital acquired infections (HAIs) following abdominal surgery. Surgical site infections (SSIs) are the most frequent type of HAI and are estimated to cost over £5,000 per patient to treat. As well as having a substantial financial impact on hospitals, patients affected by SSIs have an increased length of hospital stay and twice the mortality risk. A 2015 review of 20 trials on the topic concluded that probiotics significantly reduced SSIs and urinary tract infections (UTIs) attributable to abdominal surgeries. Data suggests this benefit is achieved without evidence of risk to patient safety and is also cost effective.

Hepatobiliary Surgery (liver surgery) and Transplant Surgery

Worldwide hepatocellular carcinoma (HCC) is the most common primary tumour of the liver. In the majority of cases the disease is detected at a late stage which accounts for a nearly 100% mortality rate. In the instances where surgery is an option the post-operative phase is often affected by poor tissue healing and liver failure. Evidence from a recent study investigating the benefits of probiotics in surgery for...
Liver cancer demonstrated an accelerated recovery in liver function and reduced markers of inflammation in patients treated with probiotics. Furthermore post-operative complications (early and late) and mortality (intra-operative and post-operative) were significantly reduced in patients receiving probiotics. Furthermore post-operative complications (early and late) and mortality (intra-operative and post-operative) were significantly reduced in patients receiving probiotics. This is supported by trials identifying the significant benefit of probiotics in reducing post-operative infection in biliary cancer surgery.\(^7\)\(^8\)

Liver transplantation can save the lives of patients suffering with liver failure. The outcomes of this surgery are improved by immunosuppressant drugs; albeit at the cost of post-transplant infections, which have a significant impact on both morbidity and mortality. A recent review of probiotics used in liver transplantation concluded that the utilisation of probiotics led to an impressive relative reduction in risk of post-transplant infection of nearly 80%.\(^9\)

**Colorectal Surgery (bowel surgery)**

Colorectal surgery encompasses a vast number of procedures to treat a disparate group of conditions which affect the large bowel (colon), rectum and anus. The majority of such operations are targeted at cancer, diverticular disease and inflammatory bowel disease.

Colorectal cancer (CRC) is the 4th most common cancer in the UK with over 41,000 new cases each year.\(^10\) Although death rates for CRC have been falling in recent decades it is the 2nd biggest cancer killer in the UK. Results from the National Bowel Cancer Audit Annual Report 2013 suggests that approximately 60% of CRC cases undergo operation.\(^11\) The vast number of patients undergoing surgery on a yearly basis has stimulated significant research into pre-operative optimisation and post-operative recovery strategies. A recent study demonstrated that probiotics significantly improved bowel symptoms and quality of life in CRC survivors.\(^12\) There is also a growing body of evidence that probiotics may reduce the risk of CRC, however further human trials are needed to confirm this benefit.\(^13\)

Diverticular disease is characterised by out-pouching of the colonic wall, which may become inflamed leading to colitis, abscess formation and even bowel perforation. The disease is a common problem in developed countries where it is posing an increasing financial burden on healthcare systems. When the bowel wall is severely inflamed it may rupture causing life threatening abdominal infection that is only manageable by major abdominal surgery and strong antibiotics. Probiotics have demonstrated the ability to improve the abdominal symptoms in uncomplicated disease\(^4\) and to also prolong the remission period between attacks of diverticulitis.\(^15\)

**Obesity Surgery (bariatrics)**

Obesity threatened the health of an estimated 600 million people worldwide in 2014.\(^16\) It is associated with numerous deadly diseases such as type II diabetes, hypertension and cancer. In cases of morbid obesity (severe obesity) bariatric surgery remains the only treatment proven to be both effective and enduring.\(^17\) One of the complications of such surgery is bacterial overgrowth, caused by alterations in the patient’s anatomy, which leads to unpleasant digestive symptoms such as abdominal pain and bloating\(^18\) and may lead to vitamin B12 deficiency. In a recent study investigating patients undergoing gastric bypass surgery\(^19\), probiotics were found to significantly reduce bacterial overgrowth and significantly increase both vitamin B12 levels and weight loss.

**Urology (Kidney, bladder and prostate surgery)**

Kidney stone formation (nephrolithiasis) is a variable process and the resultant stone may be formed from an array of excreted products. One such product is oxalic acid, originating from dietary sources, which can form insoluble crystals (calcium oxalate) that are responsible for over 70% of kidney stones.\(^20\) The pain caused by kidney stones can be extreme and often debilitating and the complications arising from them can be lethal. In instances where the stones are too large to pass naturally, or with medications, invasive surgery may be required incurring the risk of further complications for the patient and financial burden on health systems. Numerous studies have identified that probiotics are able to break down oxalate in the gut and thereby prevent the formation of stones in the urinary system.\(^20\)
Conclusion

This review demonstrates the incredible array of applications probiotics have within various surgical disciplines. Countless lives are owed to the advances in surgical sciences over the years and hopefully many more will be saved by the further addition of probiotics.

About the author:

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Dr. Ashton Harper obtained a Bsc degree in physiology and pharmacology in 2007 from University College London where he later graduated in 2010 in medicine. He worked in the NHS for 5 years during which time he discovered his passion for the management of gastrointestinal diseases. Whilst working in gastrointestinal surgery he achieved membership of the Royal College of Surgeons and was awarded a post-graduate travelling fellowship to visit the Cleveland Clinic in the USA to observe world leading doctors manage inflammatory bowel disease. He has published in the fields of nutrition and gastrointestinal diseases and has presented his work at multiple national and international medical congresses. Ashton has joined the industry as a Medical Advisor for the Protexin Human Healthcare team where he is responsible for providing medical expertise for the business.

References: