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Review Article

A retrospective review of effectiveness of ERAS post-operative pain protocol in hip replacement surgeries under general anaesthesia at a tertiary orthopaedic hospital

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ABSTRACT

Background: The concept of enhanced recovery after surgery (ERAS) was first introduced in 1997 by a group of European surgeons led by Henrik Kehlet.
The ERAS concept was introduced to target the factors delaying post-operative recovery such as organ dysfunction, surgical stress and to improve the surgical outcomes and length of stay at the hospital. The primary aim of this approach is to reduce the body's response to surgical stress by implementing a multidisciplinary, multitude of interventions in a coordinated clinical pathway. It was first implemented for colorectal surgeries to improve the post-surgical recovery rates by decreasing the post-operative ileus and thereby reducing the cost and length of hospital stay. Since the successful introduction of the program, ERAS has been used in several other specialties such as breast, urological, gynaecological, and musculoskeletal procedures. Off-late ERAS has become important in orthopaedic surgeries, particularly elective hip and knee arthroplasties.
Methods & Results: A retrospective review audit was conducted at tertiary Orthopaedic NHS Hospital to determine the effectiveness of ERAS post-operative pain protocol in patients who had primary hip arthroplasty under general anaesthesia. The qualitative and quantitative data included the length of stay at the hospital and default rates in the ERAS pain protocol. The length of stay at the hospital in ERAS compliant group was a mean of 3.95 days and in ERAS default group was 4.7 days, showing an increase of 16% in the total duration. The IV PCA group had 4.6 days of the average length of stay.
Conclusion: ERAS pathway advocates for using opioid-sparing multimodal analgesia to control pain, peripheral nerve blocks (single-shot/continuous), and local infiltration /peri-articular injections have become a better alternative to opioids in controlling the immediate post-surgical pain effectively. There is clear evidence to suggest that these techniques can improve patient outcomes and decrease the duration of stay.

1. Introduction

The concept of enhanced recovery after surgery (ERAS) was first introduced in 1997 by a group of European surgeons led by Henrik Kehlet.[1] The ERAS concept was introduced to target the factors delaying the post-operative recovery such as, organ dysfunction, surgical stress and to improve the surgical outcomes and length of stay at the hospital. The primary aim of this approach is to reduce the body's response to surgical stress by implementing a multidisciplinary, multitude of interventions in a coordinated clinical pathway.[2] It was first implemented for colorectal surgeries to improve the post-surgical recovery rates by decreasing the post-operative ileus and thereby reducing the cost and length of hospital stay. Since the successful introduction of the program,

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ERAS has been used in a number of other specialties such as breast, urological, gynaecological, and musculoskeletal procedures.[3] Off late ERAS has become important in orthopaedic surgeries, particularly elective hip and knee arthroplasties. Hip and knee arthroplasties have become one of the most common ambulatory hospital surgeries and the number of patients undergoing these surgeries is rising day by day.[1,4] According to the latest national joint registry, the number of patients undergoing hip and knee replacements is 160000 per year and the rate of these joint replacements has increased in the elderly population.[5] The ERAS pathway was introduced in the UK for joint replacement surgeries in 2009 and since then trusts have adopted and devised their own protocol to cater to the need of the population and institution to decrease perioperative complications, medical costs, and readmission rates.[6,7]

An important component of ERAS clinical pathway is to provide effective post-operative pain relief. The use of multimodal analgesia and avoiding opioid analgesics as a primary mode of postoperative analgesia has shown multiple benefits. The program particularly emphasizes avoiding the side effects of opioid analgesics like respiratory depression, drowsiness, nausea and vomiting, urinary retention, and risk of abuse. However, the control of post-operative joint arthroplasty pain can be challenging, and the aim should be directed at reducing discomfort by providing optimal analgesia rather than completely negating the pain.[8] The use of non-opioid analgesics like paracetamol, NSAIDs, local anaesthetic nerve blocks, and infiltrations have been shown to provide adequate analgesia and better side effect profile and allowing earlier safe ambulation. The use of opioid analgesics as a rescue mode of analgesia if needed in the perioperative period is still routinely used. However, there is sufficient evidence to show a stronger association between ERAS program and considerable reduction in opioid usage in post-operative period and thereby potential benefits of limiting drug addiction and dependence.[9]

While providing pain relief in the postoperative period is forms the cornerstone stone of ERAS, it is also important to provide an anaesthetic technique to limit the pain in the intra-operative period itself. There are several cohort studies reporting the benefits of neuraxial techniques over general anaesthesia including a reduction in cardiopulmonary and thromboembolic complications.[10] The recent evidence shows that both neuraxial and modern general anaesthesia may be used as part of multimodal regimens.[11] The aim of this audit is to evaluate the effectiveness of ERAS post-operative pain protocol at a tertiary orthopaedic centre.

2. Materials and Methods

A retrospective review audit was conducted at tertiary Orthopaedic NHS Hospital to determine the effectiveness of ERAS post-operative pain protocol in patients who had primary hip arthroplasty under general anaesthesia. The qualitative and quantitative data included the length of stay at the hospital and default rates in the ERAS pain protocol. All patients who had hip replacement surgeries under general anaesthesia from January 2018 till February 2020 were considered for the project. The details were collected from the hospital electronic database. 2 of 105 patients were not considered due to a lack of necessary details in the database. The cases included ASA class 1-3, both male and female patients aged above 18 years of age. Revision surgeries, juvenile hip replacements, and cases under central neuraxial blocks were not included in the audit. Since the data was collected from the hospital database, no particular data collection tool was used nor was any questionnaire used. The electronic database chart was utilized to collect the post-operative treatment results and the length of stay at the hospital. Patients who changed from ERAS post-operative pain protocol to IV PCA opioid were termed as ERAS default and those who continued with the prescribed treatment as ERAS compliant. All 103 patients were grouped into ERAS compliant, ERAS default, IV PCA group, and others as per their prescribed post-operative pain regimen. Then the total length of stay at the hospital was looked at in each of the groups and the arithmetic mean was calculated and recorded.

2.1. Data protection

This retrospective project was registered at hospital/NHS trust through the clinical audit department in February 2021. After obtaining the necessary approval from the clinical audit department the data was collected from the hospital database and the patients' details were anonymized at all stages as per GDPR data protection guidelines. Since it involves collecting retrospective data from the trust database, it doesn't require getting consent from patients and clearance from the ethical committee.[12] No external or internal funding was involved in carrying out this project.

2.2. Data analysis

The collected data was analysed using descriptive statistical tools such as measures of frequency-counts and percentages and measure of central tendency- arithmetic mean. Pie charts, bar graphs and tables were used to represent in the pictorial format of the obtained result.(Figures 1, 2 and 3)

3. Results

A total of 105 patients underwent primary hip arthroplasty under general anaesthesia at a tertiary orthopaedic referral hospital between January 2018 and February 2020. Out of 105 patients, 2 patients were excluded from the audit due to the non-availability of required data from electronic database.

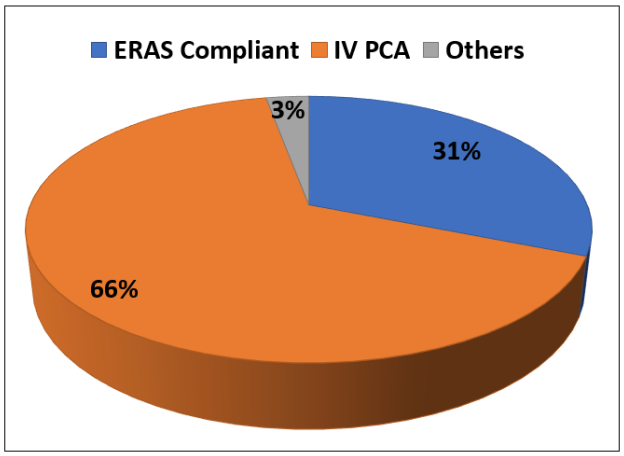

Figure 1:

32 patients out of 103 available patients were prescribed ERAS trust protocol analgesia and 68 patients were put on intravenous morphine or fentanyl (IV PCA) patient-controlled analgesia as main mode of pain control after surgery. 2 patients were on oral morphine and one patient had a regional anaesthetic block (fascia Iliaca/PENG) for pain control.

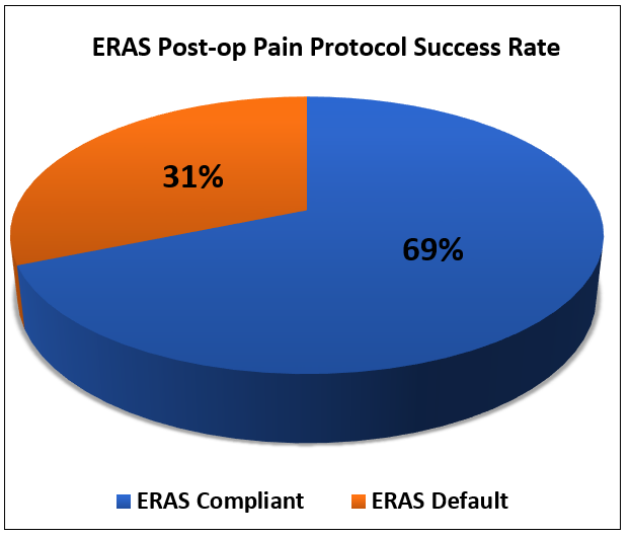

Figure 2: ERAS post-op pain protocol success rate

10 out of 32 patients who were on ERAS protocol needed IV PCA as rescue analgesia and this group of patients considered as ERAS trust protocol analgesia default group (31.25%) and the remaining 22 patients who complied with the protocol termed ERAS compliant group (68.75%) for the audit purposes.

The length of stay at the hospital in ERAS compliant group was a mean of 3.95 days and in ERAS default group was 4.7 days, showing an increase of 16% in the total duration. The IV PCA group had 4.6 days of the average length of stay.

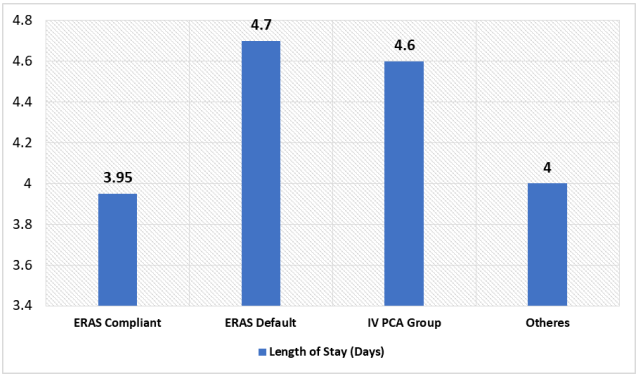

Figure 3:

4. Discussion

We can clearly see that the vast majority of patients (66%) who had general anaesthesia for their primary hip replacement was given IV PCA as the primary mode of pain control during the post-operative period. It can be argued that there is growing consensus among treating anaesthetists that ERAS protocol employed at the trust is not sufficient to cover the pain in those patients who had general anaesthesia for surgery. In literature several multicentre studies showed an increased risk of moderate to severe pain (up to 8.5-fold) and 2.5-fold increase in persistent postsurgical pain after hip arthroplasties in association with general anaesthesia.[8]

As ERAS pathway advocates for using opioid-sparing multimodal analgesia to control pain, peripheral nerve blocks (single-shot/continuous) and local infiltration /peri-articular injections have become a better alternative to opioids in controlling the immediate post-surgical pain effectively. There is clear evidence to suggest that these techniques can improve patient outcomes and decrease the duration of stay.[11] In the audit study group only one out of 103 patients had a peripheral nerve block for postoperative pain management. As for as local infiltration analgesia is concerned, it has got advantages over peripheral nerve blocks of not producing motor blockade or muscle weakness allowing for early ambulation but the concerns regarding wound healing, infection, and local anaesthetic toxicity have been raised.[13] Many long-term studies have demonstrated that there is less evidence to support local anaesthetic toxicity with standard techniques and no increased risk in joint infection rates.[10] Currently, LIA forms the part of multimodal analgesia in knee replacement surgeries but not in hip replacement and it is implemented at hospital by some surgeons. However, this study did not look into the details of patients who had LIA as part of their ERAS post-operative pain protocol.

Many studies have shown that adverse effects associated with opioids like nausea and vomiting and drowsiness can prolong the length of stay by limiting ambulation.[14,15] IV PCA in particular hampers movement due to IV access connected to the PCA pump and restricting the patients to function independently.[11] Although the ERAS programs emphasize utilizing non-opioid analgesics and alternate forms of analgesia, opioids still form part of post-surgical pain treatment. Opioids are implemented in ERAS protocol for a smooth transition from immediate peripheral nerve blocks to non-opioid analgesics. It is still debated about the choice and method of opioid delivery. Many centres now use oxycodone-controlled release oral tablets for pain control after joint replacement and there is evidence to show that they are equipotent in analgesia and also offering the benefit of improved compliance and shorter length of stay at the hospital when compared to IV PCA regimens.[16] The recent consensus is to use newer opioids like oxycodone when required as part of a multimodal approach.[11] Oxycodone forms the part of ERAS pain protocol from immediate post-operative period till 2^{nd} post-operative day at the trust.

5. Strength and Limitations

This retrospective study was done in view to address the effectiveness of ERAS pain protocol at the trust level in patients who had general anaesthesia. There are hardly any audits or studies in the literature that looked into this topic. It is a retrospective audit and data was collected from the hospital database hence, it has the advantage of being quick, less time-consuming, and immediate availability of data. When compared to prospective audits, it also has the advantage of the absence of loss of data due to drop-outs and follow-ups.[17]

One of the limitations of this study is the lack of pain scores. As there were no standardized numerical rated scores (NRS) used while documenting the pain scores by anaesthetists and nursing team,[18] it is challenging to assess at what point of pain score the patient needed the changeover from ERAS pain protocol to IV PCA regimen. This audit also did not look into local infiltration analgesia as there is sufficient evidence in the literature to show that as part of multimodal analgesia it can improve the pain scores and success rate of ERAS.[11] For the calculation of the length of hospital stay, arithmetic mean was used instead of the median and this may be skewed when the study population is small.[4]

6. Conclusion

This audit demonstrates that there is a 16 percent increase in length of stay at the hospital in patients who had IV PCA when compared to ERAS compliant group. At this point, it is prudent to compare the same outcomes in patients who had neuraxial anaesthesia for their hip replacement and to ascertain whether neuraxial techniques are better suited to control post-operative pain and increase the success rate of ERAS pain protocol at hospital.

The recommendation of this audit is to use peripheral nerve blocks as part of multimodal analgesia especially in patients who had general anaesthesia for hip replacement surgeries. The standardized pain scoring system like NRS scale (0-10) should be used at all levels to record the pain as it avoids confusion between the clinicians. A re-audit would be required after one year of implementing the above measures at the trust to assess the impact.

7. Source of Funding

None.

8. Conflict of Interest

None.

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