Application Of Robotic Systems In Healthcare And Reduced Infection Risk In Cancer Patients In Postoperative Oncology Surgical Patients.

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Abstract:
This research aims to investigate the impact of robotic systems in oncology surgery, focusing on sensitive cases such as brain and colon cancer. The study includes a group of 5 male and female patients, and data is collected post-surgery, particularly after patient recovery. The significant advantages of robotic surgery are documented in observational tables and charts. The findings suggest a promising future for robotic systems in surgery, with reduced recorded risks.
Keywords*: Robotic surgery, craniotomy, colon cancer Patients.*

I.   Introduction:

Several areas directly related to patient health or indirectly associated with postoperative care saw a significant decrease in infection rates during and after surgery due to the healthcare system's recent advancements, which also significantly impacted the quality of patient care[1].

Research on robots in medicine shows that most cancer patients at risk for infection have sharply declined infections following surgery[2].

In recent years, the healthcare system's advancements, particularly the widespread adoption of robotic systems, have played a crucial role in decreasing infection rates in various areas directly related to patient health and postoperative care[3]. This improvement has significantly enhanced the overall quality of patient care. Research on using robots in medicine has shown a noticeable decrease in infection rates among cancer patients at risk following surgery. Surgeries for high-risk conditions such as liver cancer and brain tumours have seen particularly successful outcomes, thanks to the advancements in robotic systems like the da Vinci surgery.[4]. The widespread adoption of robotic systems, including the laparoscopic procedure, has revolutionised contemporary surgical practices.[5].

II.   Materials And Methods

The data in this research was obtained from patients directly exposed to robotic surgery. The patient consent form was obtained directly from the patient in research studies PCF/02/2024.CBH. The data obtained from a patient and his relative after considering the patient's health condition: Patients who remain in ICU for a longer time, more than ten days, are excluded from studies due to ethical considerations, as they may be exposed or face other challenges while receiving treatment.

For each case related to surgery, we selected n = 10; however, in female patients, we chose n = 5 because, in some cases, there is not enough data to be obtained. The instances exposed to the infection after surgery were also included in this study. Still, the infections related to the surgery were not accompanied by any disease or patient history. Our careful patient selection process ensures the integrity of our study.

III. Type Of Robotic Surgery

Da Vinci's Robotic System[6]

Figure 1, Da Vinci Robotic System

It is a robotic surgery system that offers a minimally invasive alternative to both open surgery and laparoscopy.[7] Because robotic or robot-assisted surgery requires only a few tiny incisions and offers more excellent vision, precision, and control for the surgeon, patients often recover sooner.[8].

IV. Benefits Of Robotic Surgery

☐ Reduced pain
☐ Lower risk of infection or complications
☐ Less blood loss
☐ Shorter hospital stays
☐ Lees scarring due to smaller incisions
☐ Faster return to everyday activities

V. The Types Of Surgery That The Robotic System Can Perform Are

☐ Prostatectomy
☐ Hysterectomy
☐ Colectomy and
☐ Total Knee Replacement

VI. Statically Analysis

All the data were subjected to column statistical analysis to obtain the mean ± S.E.M. values for the group. These values were used to assess whether the treatments were significant using a one-way analysis of variance (ANOVA) followed by Dennett's test. (Graph Pad Prism 10 for Windows, Version 10.3.0 (226). The P value ($P<0.05$) and
($P<0.01$) were considered as significant.

VII. Result

In Craniotomy surgery (Brain surgery).

Patients undergoing brain tumour removal have shown significant recovery and reduced postoperative infection risk. Notably, some patients experienced even better outcomes after receiving adjuvant chemotherapy, highlighting its role in improving results.

The gender-based results, with a P value of $P>0.001$ in both male and female groups, further support the positive trend. However, it's important to note that age is a factor, with elderly patients showing higher mortality rates, as detailed in the table below.
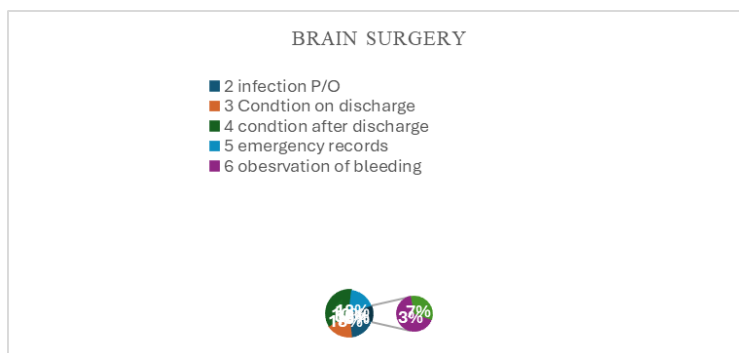
Figure 1: The data obtained from Brain surgery, male and Female groups

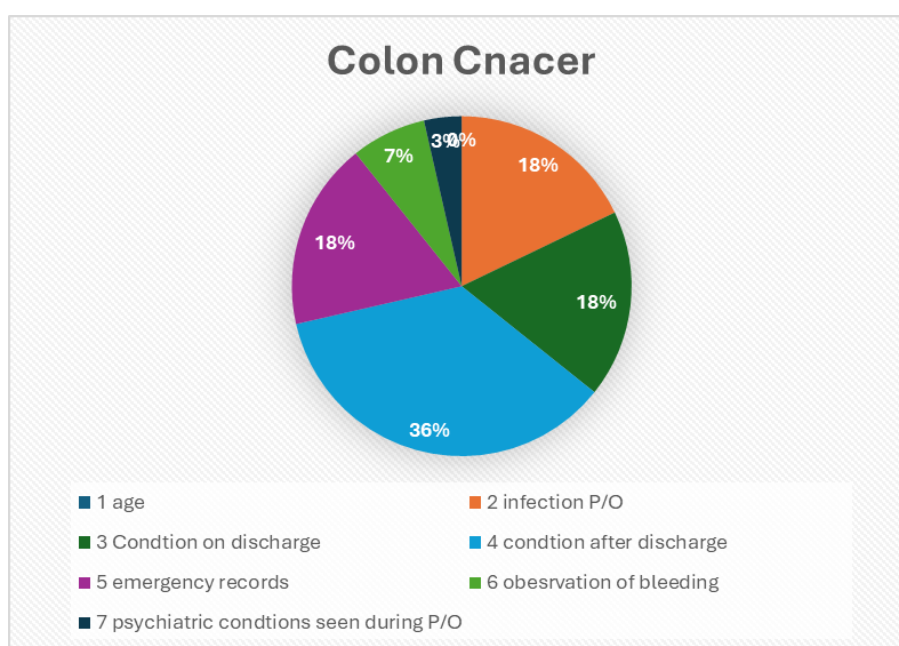**Table 1, observation table for craniotomy patients**

Observations	Male Patients	Female Patient
Age	25-60	20-60
Infection P/O	10	10
Condtion on discharge	Good	Good
Condition after discharge (more than 30 days)	Good	Good
Emergency records after discharge	no	Less than 2%
Observation of Bleeding	In some case	In some case
Psychiatric conditions seen during P/O	No	Some case
Uses of any psychiatric medication	No	Some patients required

P/O=postoperative.

In the group studies, the proportion of female patients who received antipsychotic medication was lower than 2% of male patients.

Colon cancer

When compared to the male and female groups of patients, the observation made in the patients undergoing robotic surgery for colon cancer showed no significant outcome; when compared to all group studies, the result significance showed no mortality recorded following the administration of chemotherapy for six cycles.

Figure 2: the data obtained in colon patients in male and female groups

Table 2, observation table for colon cancer patients

Observations	Male Patients	Female Patient
Age	25-60	25-55
Infection P/O	5	7
Condtion on discharge	Not good	Good
Condition after discharge (more than 30 days)	Good	Good
Emergency records after discharge	Yes	Yes
Observation of Bleeding	Yes	Yes
Psychiatric conditions seen during P/O	No	No
Uses of any psychiatric medication	No	No

The bleeding was recorded immediately after discharge because the position started to become sensitive; in some patients, the closing time is less, so this research is behind the bleeding after surgery.

Evaluation of patient satisfaction after surgery and the outcomes of uses of robotic systems in complex surgery, the number of patients who agree that the remote has benefits to them is compared to the patient that has less experience; this is because either they are not family to this system or they have doubt about it .but all the surgical activity done by the report are carry by doctors himself during all procedure how ever less concentration is required by doctors and other staff during the surgery.

VIII.   Conclusion

The advantage of the robotic system overall procedures used in complex surgery is that robots remain the best in terms of patient satisfaction and outcome after the procedure; however, in some cases, reports show less efficiency, and this is not because of the reboot system, patient's medical history or complexity of the surgery.

In patients with brain cancer, the outcome significance is excellent because the accuracy and the recovery time are more significant after the patient is carefully observed during the presence in the hospital and after discharge.

We do not consider chemotherapy's adverse effects because this is related to other issues that could lead us to another part. The number of groups is scrutinised, and biose could be there as some clinical parameters are not included in this study.

Gender, age and patient history vary, which is not the main factor in our research study groups.

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