COLONOSCOPY SCREENING IN THE US ASTRONAUT CORPS

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BACKGROUND

Historically, colonoscopy screenings for astronauts have been conducted to ensure that astronauts are in good health for space missions. Recently this historical data has been identified as being useful for developing an occupational surveillance requirement. It can be used to assess overall colon health and to have a point of reference for future tests in current and former astronauts, as well as to follow-up and track rates of colorectal cancer and polyps. These rates can be compared to military and other terrestrial populations.

In 2003, the active astronaut colonoscopy requirements changed to require less frequent colonoscopies. Since polyp removal during a colonoscopy is an intervention that prevents the polyp from potentially developing into cancer, the procedure decreases the individual's risk for colon cancer. The objective of this study is to evaluate the possible effect of increased follow-up times between colonoscopies on the number and severity of polyps identified during the procedures among both current and former NASA astronauts. Initial results and forward work regarding astronaut colonoscopy screenings will be presented.

METHODS

A retrospective study of all colonoscopy procedures performed on NASA astronauts between 1962 and 2015 (both during active career and retirement) was conducted by review of the JSC Clinic Electronic Medical Record and Lifetime Surveillance of Astronaut Health (LSAH) database for colonoscopy screening procedures and pathology reports. The timeframe of interest was from the time of selection into the Astronaut Corps through May 2015 or death. For each colonoscopy report, the following data were captured: date of procedure, age at time of procedure, reason for procedure, quality of bowel prep, completion of procedure and/or reason for termination of procedure, findings of procedure, subsequent treatment (if any), recommended follow-up interval, actual follow up interval, family history of polyps or colon cancer, and other significant items or discrepancies. The population consisted of 338 astronauts: 52 females, 286 males. Of these, 56 were deceased, and 11 astronauts had no record of any colonoscopies. Because of a screening requirement change in 2003, analyses were conducted to determine if there were differences between the two time periods. One-sided Wilcoxon rank sum tests were used to identify statistically significant differences between the two time periods.

RESULTS

There was a combined total of 1,964 colonoscopy screenings identified. The average follow-up intervals between colonoscopies were indeed longer after the screening requirement change than before the change. The mean follow-up interval pre -2003 was 3.59 years, while post-2003 it increased to 4.35 years. The statistical significance of this difference was confirmed using a one sided Wilcoxon rank sum test which yielded $p<.001$. Colonoscopies performed after the requirement change tended to have a higher incidence and greater severity of polyps. From pre-2003 to post-2003 the percentage of colonoscopy procedures yielding no polyps decreased from 83.77% to 74.70%. Not only did post-2003 procedures yield more polyp findings, but the polyps recorded were more often of severe pathology. Before 2003 3.62% of colonoscopy findings were polyps of the hyperplastic type (the least severe polyp type) and only 3.35% were of greater severity. Post-2003, 4.21% of findings were hyperplastic polyps while 11.44% were of greater severity.

Upon the investigation of other possible contributing factors to these results, we also found that mean age post-2003 was 54.55 years which was significantly higher than during the pre-2003 timeframe (47.32 years). This was observed with a one-sided Wilcoxon rank sum test, resulting in a $p<0.001$. The increased average age of astronauts could also be a contributing factor to the greater number of polyps found since the risk of developing polyps increases with age. Further work is needed to better understand the increased incidence and greater severity of polyps found in astronaut colonoscopy outcomes.