HRCT Surrogate for Vaccine Efficacy?

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The Present Pandemic Continues Unabated with Increasing Ferocity with Each Wave. The only way out of this pandemic appears to be creating herd immunity to the virus, either innate from infection or vaccination. There are three important terms to determine the efficacy of vaccines, namely vaccine efficacy, vaccine effectiveness, and breakthrough infections. Vaccine efficacy refers to the ability of the vaccine to reduce the incidence of infection. In a controlled clinical environment, the number of vaccinated individuals getting infected versus the number getting infected after receiving a placebo.[1] Vaccine effectiveness refers to the rate of infection occurring in the real world. More importantly is the term breakthrough infections, when infection breaks through the vaccine shield. Breakthrough infections have been seen with all vaccines as the efficacy and effectiveness of all vaccines are not 100%. In view of breakthrough infections, the real effectiveness of vaccines will be to reduce the severity of infection in terms of the development of pneumonia, hospitalization, and mortality. Merely adding up the number of positive RT PCR following vaccination will be not of much value; however, what would be important is a measure of the severity of breakthrough infections as compared with non-vaccinated individuals or between different vaccines/vaccination schedules/vaccine combinations.

Computed tomography (CT) has played a stellar role in this pandemic, much against the recommendations and guidelines issued by numerous national societies.[2] CT has worked as a public service tool in detecting false-negative RT PCR cases, thus aiding in the early isolation of super spreaders.[3] CT has also assisted in clinical management by demonstrating lung involvement and complications of COVID-19. Probably, the most important contribution of CT has been the CT severity index or percentage of lung involvement. Not only does the CT severity index demonstrate the extent of lung involvement, which helps prognosticate, but has played a pivotal role in triaging, reducing the burden on medical facilities. The severity of lung involvement correlates extremely well with oxygen requirement, type of oxygen requirement invasive/non-invasive, ICU admissions.[4] Because the CT severity index is a surrogate for determining the severity of illness, it would be a useful and realistic tool to evaluate the real effectiveness of vaccines in reducing the severity of the disease. Initial studies applying this thought process have been performed, the initial results have demonstrated a reduced CT severity index in vaccinated individuals as compared with non-vaccinated individuals.[5]

These results would be important to understand the value and contribution of vaccination, especially in individuals who are not keen on vaccination thus propelling the planet toward herd immunity.

References

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