Comment & Analysis
Images in Medicine

Changes in the Normal Cellular Architecture in the Prostatic Tissue with the Increasing age

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Abstract

The frequency of the prostate disorders has been on the increase and disorders such as prostatitis, Benign Prostatic Hyperplasia and Prostatic Cancer have been on the rise. This study involved 60 cases which were further subdivided into various age groups. Study was based on the microscopic examination of prostatic tissue with individual tissues of different age groups. The microscopic examination of prostatic tissue of different age groups showed that the prostate tissue in contrast to other organs shows hyperplasia instead of atrophy and that as the age increases there is more proliferation of fibro- musculo glandular tissue producing increase in the size of prostate which manifests itself in the form of Benign Hyperplasia of Prostate. In certain Unfortunate conditions there is profound increase in the glandular element progressing to latent carcinoma of prostate and then to full fledged Carcinoma. A need for urgent readressal to the patient's complaints as well as the importance of biopsy and histopathological examination of the tissue is important in the management of the problem. The histopathological examination can aid the physician/Surgeon to give the exact details about the possibility of cure, Effective therapy, and staging and most importantly the prognosis of the patients' condition. In conclusion, there is change in the normal cellular architecture with the increasing age in the prostatic tissue.

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Introduction

Starting from earlier times till modern time, the study of prostate has been a dynamic one and the basic anatomical knowledge of the prostate has undergone much change apart from the new techniques, micro invasive procedures and the chemotherapeutic approach for various disorders of the gland.

Most of the organs undergo atrophy with increasing age but most of the times prostate undergo hyperplasia which is of clinical relevance. The changes occur at both microscopic level as well as macroscopic level. The Current study is aimed at looking into histological changes and accompanying other related changes.
In the modern era, especially in the elderly males, people come with complaints of the prostate gland. The frequency of the prostate disorders has been on the increase and disorders such as prostatitis, Benign Prostatic Hyperplasia and Prostatic Cancer have been on the rise.

To study the various changes the prostate undergoes during its development as the age passes by, is a topic of immense interest.

Most of the complaints by any patient to a doctor are related to problems in the abdominopelvic region. It has been found that of all the cases in out patients department, 75 percent people complain of symptoms in the region of abdomen and pelvis.

Especially in case of males the complaints in the pelvic region are comparable to females. As we have predominantly symptoms related to ovaries and cervix in case of females similarly we have growing concerns and problems concerning prostate in males. Being a very important organ of the male genito urinary system and the rapid progress made in the field of Anatomy, Histology, Pathology Surgery, Radiology the finer details about the organs makes our study more interesting and mind absorbing.

Physiological Aspects

In the earlier days the prostate was considered as a physiologically inert structure with not much activity. But steadily with time and more studies with renewed interest in prostate the concept of prostate as an inert organ began to decline and it was considered to be a *potentially active organ* and in fact more active than other organs of the male reproductive tract. The study of the prostatic fluid and subsequent research on the composition of this fluid with high concentrations of prostaglandins, fructose, spermine, zinc, fibrinolysin, fibrinogenase, acid phosphatase and ascorbic acid was against the view.

Furthermore, study on elaboration of *Prostate Specific Antigen (PSA)* which is a *30 k DA serine protease* and its elevation in case of Prostatic cancer especially proved to be significant as a screening test for Prostate Cancer. It was found to be increased in some cases of Benign Prostatic Hyperplasia as well as Prostatitis also. Normal range: 0-4 ng/ml

In order to improve specificity of PSA Levels, a *new index PSAD (Prostate Specific Antigen Density)* is now used which is obtained by dviding serum PSA levels by estimated Prostatic weight estimated by *TRUS (Trans rectal Ultrasonography)*

Important constituents of prostatic fluid include prostaglandins, fructose, spermine, zinc fibrinolysin, fibrinogenase, acid phosphatase, and ascorbic acid.

Prostatic Growth is directly related to *Dihydrotestosterone levels (DHT)***.** Testosterone is converted into Dihydrotestosterone by an enzyme 5 alpha reductase.

The role of DHT in benign Hyperplasia of Prostate is directly supported by the fact that 5 alpha reductase inhibitors directly inhibit Prostatic Growth. As a result nowadays many drugs based on this physiological effect of 5 alpha reductase activities are used to reduce the size of enlarged prostate with considerable success.

Objectives

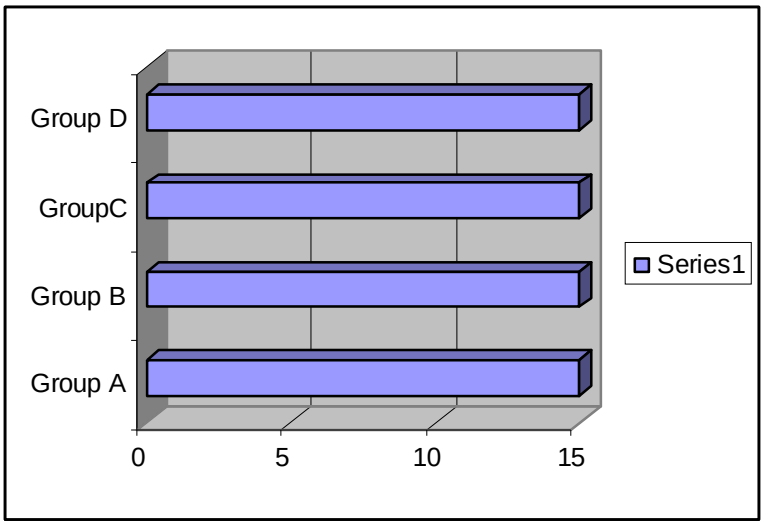
- Diagnosis with best possible accuracy (histopathological diagnosis offers the most conclusive proof of diagniosis).
- Differentiating acute conditions from chronic conditions, evaluating grades of tumors, evaluating response to therapy, staging of diseases, evaluating metastasis, differentiating benign from malignant

diseases, studying tissues at a Genetic/ Molecular level i.e. hormonal studies, receptor studies, immunological assays, DNA analysis, enzyme assays, and PCR assays.

Methods

The present study involved 60 cases which were further subdivided into various age groups. The cases were divided into four different age groups namely:

1. *Group : 45 -55 years*
2. *Group B: 56 – 65 years*
3. *Group C: 66 – 75 years*
4. *Group D: 76 onwards.*



All of the patients were males and the distribution of cases was irrespective of religious criterion ie there was a random selection of cases as far as the religion was concerned.

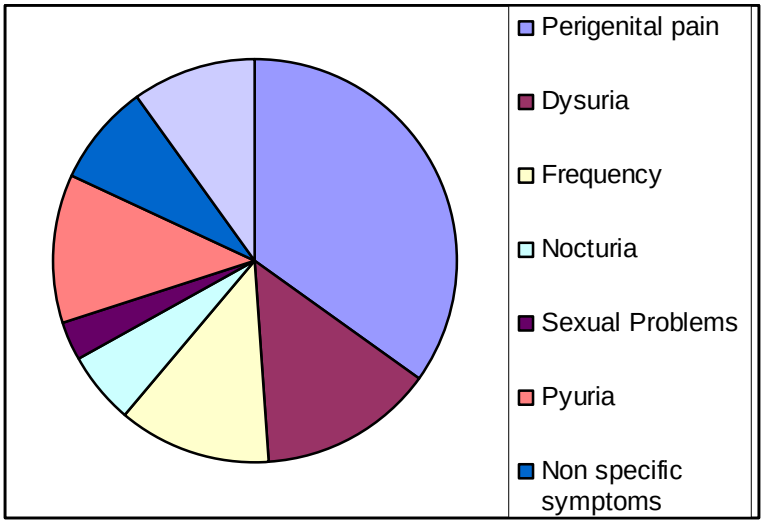
The observations were made from the Prostate specimen collected and then through the proper histological technique the tissue was processed up to the stage of observation.

Group A	15 Prostate specimen
Group B	15 Prostate specimen
Group C	15 Prostate specimen
Group D	15 Prostate specimen

Results

The present study was based on the microscopic examination of prostatic tissue with individual tissues of different age groups.

The microscopic examination of prostatic tissue of different age groups showed that the Prostate tissue in contrast to other organs shows hyperplasia instead of atrophy and that as the age increases there is more proliferation of fibro- musculo glandular tissue producing increase in the size of prostate which manifests itself in the form of Benign Hyperplasia of Prostate.



Group A

Normal Histology	12 cases
BPH	3 cases

Group B

Normal Histology	10 cases
BPH	5 cases

Group C

Normal Histology	7 cases
BPH	6 cases
Chronic Prostatitis	2 cases

Group D

Normal Histology	6 cases
BPH	7 cases
Chronic Prostatitis	0 cases
Adeno carcinoma Prostate	2 cases

In certain conditions there is profound increase in the glandular element progressing to latent carcinoma of prostate and then to full fledged carcinoma.

Normal Prostate

Increase in age/ Testosterone

Benign Hypertrophy of Prostate

Excessive Hormonal Stimulation

Prostatic Intraepithelial Neoplasia

Cancer Prostate (Adenocarcinoma)

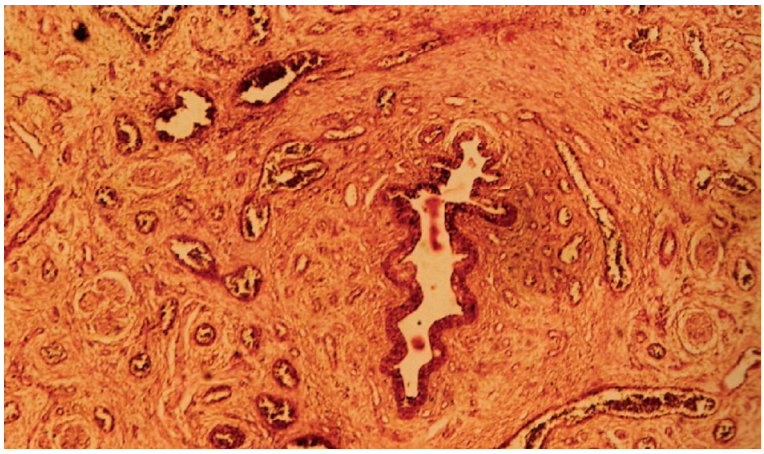


Fig 1: Haematoxylin and Eosin stain 100x showing Prostatic Urethra in the centre, small glands surrounding the urethra and small vessels

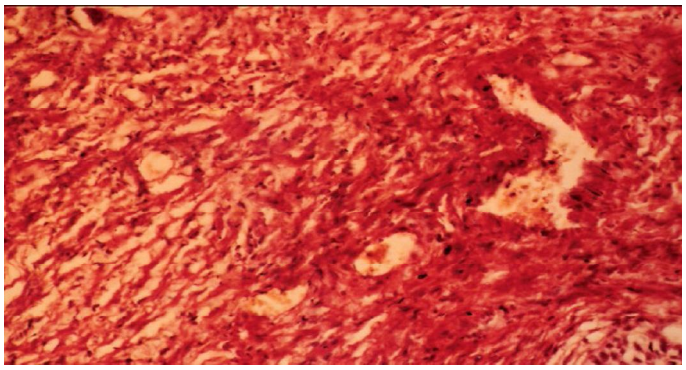


Fig 2: Haematoxylin and Eosin stain 100x showing predominantly Fibromuscular Hyperplasia in a case of Benign Hyperplasia of Prostate. The Glandular Element is not seen at all.

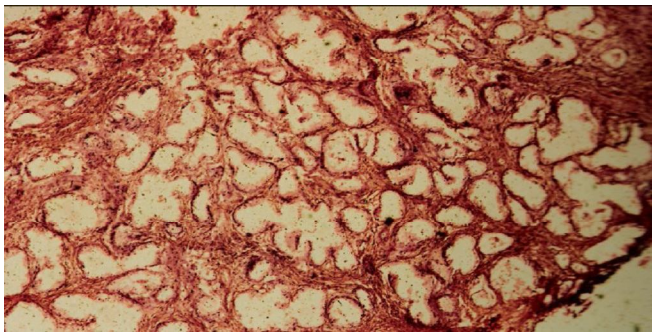


Fig 3: Haematoxylin and Eosin stain 100x showing Prostatic Urethra in the centre, small glands surrounding the urethra and small vessels

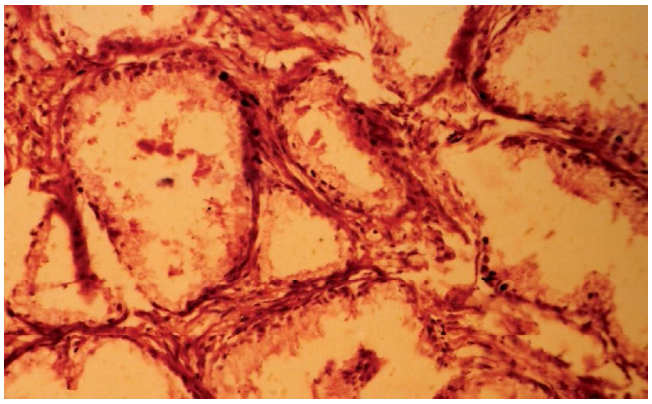


Fig 4: Haematoxylin and Eosin stain 100x showing Benign Hyperplasia of Prostate with Predominant glandular proliferation and reduced stroma. The glands are increased both in size as well as number.

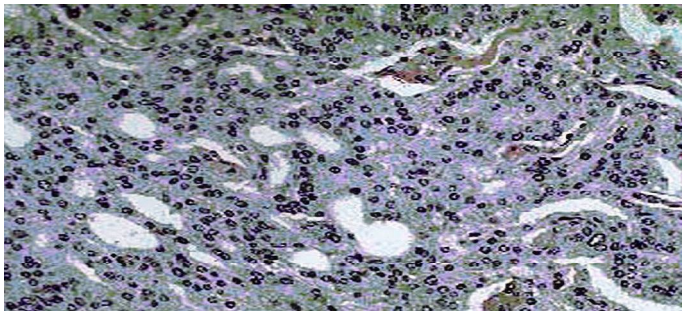


Fig 5: Haematoxylin and Eosin stain 200x showing malignant proliferation of Prostate gland. Neoplastic cells are seen distributed throughout the gland.

Discussion

The normal prostatic tissue undergoes immense changes due to hormonal stimulation and as the age increases. There appears to be a proliferation of all the three elements *(fibrous, muscular and the glandular element)*. However in some cases there is more proliferation of one element than the other. There can be a mixed response as well. Associated with these changes we also have the increase in the concretions ie the *Corpora Amylacea* tends to increase in Number as the age grows. There tends to be more concentration of Prostatic Secretions which in due course tend to become calcified to produce these atypical bodies characteristic of Prostate.

Moreover, the fibrous tissue is laid in irregular pattern as can be the case with muscular element giving the appearance of characteristic *nodularity* to the BHP.

In some cases there is excessive proliferation of the epithelial/ glandular elements which in some cases remains confined to only a part of prostate forming small foci of Prostatic cancer *(Carcinoma in Situ)* within a normal prostate. However, in some cases this glandular proliferation is more extensive involving major parts of prostate forming the *Cancer Prostate* which can produce both localized effects as well as metastatic effects.

The effects can be in the form of *Bladder Outlet Obstruction* as well as spread to bones especially the Vertebrae, Pelvis in the form of Osteoblastic secondaries as compared to Osteolytic lesions of other organs.
So far the increase in the number of BHP cases received daily in the hospitals is concerned, cancer of prostate seems to be a problem of major concern not only in developed countries but in developing country like India. A need for urgent readressal to the patient's complaints as well as the importance of biopsy and histopathological examination of the tissue is important in the management of the problem. The histopathological examination can aid the physician/Surgeon to give the exact details about the possibility of cure, Effective therapy, and staging and most importantly the prognosis of the patients' condition.

Conclusion

By knowing the normal first, we can comment on abnormal. In this study we have been simultaneously examining the normal as well as abnormal tissues and come out with a conclusion that there is change in the normal cellular architecture with the increasing age in the Prostatic tissue.

Bibliography

1. Anderson RU. Prostatic secretion Leucocyte studies in non bacterial prostatitis. J Urol.1992:148:1461-6

2. Arrighi, MH et al. Natural History of BHP. The Baltimore Longitudnal study of aging.Urol (suppl)38:4:1991

3. Culling CFA .Handbook of Histopathological Techniques. 1963

4. Benign Hypertrophy of Prostate. Robbins Textbook of Pathology. 2007

5. Drach GW. Classification of benign diseases associated with prostatic pain. J. Urol 1978:120:226

6. Guskow AR, Chronic bacterial prostatitis as a means of immunodeficiency state. Epid immune. 1998: 47-51

7. Histology of Prostate. Muzzamullahs Textbook of Histology. 2005

8. Meares EM Jr. Prostatitis and related disorders. Campbell Urology 6 th EDN 1992:807-822

9. Prostatitis in men with elevated PSA. Journ Urology. Jeanette M Potts. 2000:164: 1550-1553.