In [1]:

```
import pandas as pd import numpy  as npimport  matplotlib.pyplot as pltimport seaborn as sns
df = pd.read_csv('Customer Churn.csv')df
```

Out[1]:

	customerID	gender	SeniorCitizen	Partner	Dependents	tenure	PhoneService	MultipleLines	InternetService	OnlineSecurity	...	DeviceProtection	TechSupport	StreamingTV	StreamingMovies	Contract	PaperlessBilling	PaymentMethod	MonthlyCharges	TotalCharges	Churn
0	7590-VHVEG	Female	0	Yes	No	1	No	No phone service	DSL	No	...	No	No	No	No	Month-to-month	Yes	Electronic check	29.85	29.85	No
1	5575-GNVDE	Male	0	No	No	34	Yes	No	DSL	Yes	...	Yes	No	No	No	One year	No	Mailed check	56.95	1889.5	No
2	3668-QPYBK	Male	0	No	No	2	Yes	No	DSL	Yes	...	No	No	No	No	Month-to-month	Yes	Mailed check	53.85	108.15	Yes
3	7795-CFOCW	Male	0	No	No	45	No	No phone service	DSL	Yes	...	Yes	Yes	No	No	One year	No	Bank transfer (automatic)	42.30	1840.75	No
4	9237-HQITU	Female	0	No	No	2	Yes	No	Fiber optic	No	...	No	No	No	No	Month-to-month	Yes	Electronic check	70.70	151.65	Yes
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7038	6840-RESVB	Male	0	Yes	Yes	24	Yes	Yes	DSL	Yes	...	Yes	Yes	Yes	Yes	One year	Yes	Mailed check	84.80	1990.5	No
7039	2234-XADUH	Female	0	Yes	Yes	72	Yes	Yes	Fiber optic	No	...	Yes	No	Yes	Yes	One year	Yes	Credit card (automatic)	103.20	7362.9	No
7040	4801-JZAZL	Female	0	Yes	Yes	11	No	No phone service	DSL	Yes	...	No	No	No	No	Month-to-month	Yes	Electronic check	29.60	346.45	No
7041	8361-LTMKD	Male	1	Yes	No	4	Yes	Yes	Fiber optic	No	...	No	No	No	No	Month-to-month	Yes	Mailed check	74.40	306.6	Yes
7042	3186-AJIEK	Male	0	No	No	66	Yes	No	Fiber optic	Yes	...	Yes	Yes	Yes	Yes	Two year	Yes	Bank transfer (automatic)	105.65	6844.5	No

7043 rows × 21 columns

In [ ]:

In [ ]:

In [2]:

```
df.shape
```

Out[2]:

```
(7043, 21)
```

In [3]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7043 entries, 0 to 7042
Data columns (total 21 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   customerID        7043 non-null   object
 1   gender            7043 non-null   object
 2   SeniorCitizen     7043 non-null   int64
 3   Partner           7043 non-null   object
 4   Dependents        7043 non-null   object
 5   tenure            7043 non-null   int64
 6   PhoneService      7043 non-null   object
 7   MultipleLines     7043 non-null   object
 8   InternetService   7043 non-null   object
 9   OnlineSecurity    7043 non-null   object
 10  OnlineBackup      7043 non-null   object
 11  DeviceProtection  7043 non-null   object
 12  TechSupport       7043 non-null   object
 13  StreamingTV       7043 non-null   object
 14  StreamingMovies   7043 non-null   object
 15  Contract          7043 non-null   object
 16  PaperlessBilling  7043 non-null   object
 17  PaymentMethod     7043 non-null   object
 18  MonthlyCharges    7043 non-null   float64
 19  TotalCharges      7043 non-null   object
 20  Churn             7043 non-null   object
dtypes: float64(1), int64(2), object(18)
memory usage: 1.1+ MB
```

replacing blanks with 0 in TotalCharges

In [6]:

```
df["TotalCharges"] = df["TotalCharges"].replace(" ","0")df["TotalCharges"] = df["TotalCharges"].astype("float")
```

In [7]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7043 entries, 0 to 7042
Data columns (total 21 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   customerID        7043 non-null   object
 1   gender            7043 non-null   object
 2   SeniorCitizen     7043 non-null   int64
 3   Partner           7043 non-null   object
 4   Dependents        7043 non-null   object
 5   tenure            7043 non-null   int64
 6   PhoneService      7043 non-null   object
 7   MultipleLines     7043 non-null   object
 8   InternetService   7043 non-null   object
 9   OnlineSecurity    7043 non-null   object
 10  OnlineBackup      7043 non-null   object
 11  DeviceProtection  7043 non-null   object
 12  TechSupport       7043 non-null   object
 13  StreamingTV       7043 non-null   object
 14  StreamingMovies   7043 non-null   object
 15  Contract          7043 non-null   object
 16  PaperlessBilling  7043 non-null   object
 17  PaymentMethod     7043 non-null   object
 18  MonthlyCharges    7043 non-null   float64
 19  TotalCharges      7043 non-null   float64
 20  Churn             7043 non-null   object
dtypes: float64(2), int64(2), object(17)
memory usage: 1.1+ MB
```

In [8]:

```
df.isnull().sum()
```

Out[8]:

```
customerID          0
gender              0
SeniorCitizen       0
Partner             0
Dependents          0
tenure              0
PhoneService        0
MultipleLines       0
InternetService     0
OnlineSecurity      0
OnlineBackup        0
DeviceProtection    0
TechSupport         0
StreamingTV         0
StreamingMovies     0
Contract            0
PaperlessBilling    0
PaymentMethod       0
MonthlyCharges      0
TotalCharges        0
Churn               0
dtype: int64
```

In [9]:

```
df.describe()
```

Out[9]:

	SeniorCitizen	tenure	MonthlyCharges	TotalCharges
count	7043.000000	7043.000000	7043.000000	7043.000000
mean	0.162147	32.371149	64.761692	2279.734304
std	0.368612	24.559481	30.090047	2266.794470
min	0.000000	0.000000	18.250000	0.000000
25%	0.000000	9.000000	35.500000	398.550000
50%	0.000000	29.000000	70.350000	1394.550000
75%	0.000000	55.000000	89.850000	3786.600000
max	1.000000	72.000000	118.750000	8684.800000

In [10]:

```
df.duplicated().sum()
```

Out[10]:

```
np.int64(0)
```

In [11]:

```
def conv(value):
    if value == 1 :
        return "yes"
    else :
        return "no"
df["SeniorCitizen"] = df["SeniorCitizen"].apply(conv)
```

In [12]:

```
df.head()
```

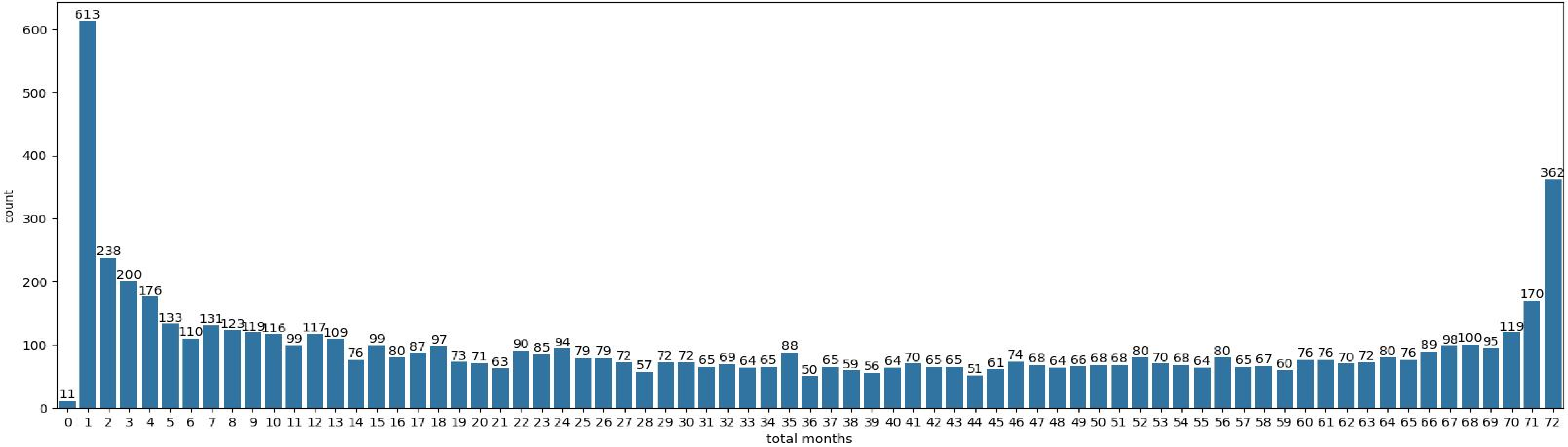
Out[12]:

	customerID	gender	SeniorCitizen	Partner	Dependents	tenure	PhoneService	MultipleLines	InternetService	OnlineSecurity		DeviceProtection	TechSupport	StreamingTV	StreamingMovies	Contract	PaperlessBilling	PaymentMethod	MonthlyCharges	TotalCharges	Churn
0	7590-VHVEG	Female	no	Yes	No	1	No	No phone service	DSL	No		No	No	No	No	Month-to-month	Yes	Electronic check	29.85	29.85	No
1	5575-GNVDE	Male	no	No	No	34	Yes	No	DSL	Yes		Yes	No	No	No	One year	No	Mailed check	56.95	1889.50	No
2	3668-QPYBK	Male	no	No	No	2	Yes	No	DSL	Yes		No	No	No	No	Month-to-month	Yes	Mailed check	53.85	108.15	Yes
3	7795-CFOCW	Male	no	No	No	45	No	No phone service	DSL	Yes		Yes	Yes	No	No	One year	No	Bank transfer (automatic)	42.30	1840.75	No
4	9237-HQITU	Female	no	No	No	2	Yes	No	Fiber optic	No		No	No	No	No	Month-to-month	Yes	Electronic check	70.70	151.65	Yes

5 rows × 21 columns

In [92]:

```
plt.figure(figsize=(20,6))d = sns.countplot( x ='tenure' , data = df)for bars in d.containers:
    d.bar_label(bars)plt.xlabel('total months')plt.ylabel('count')plt.show()
```



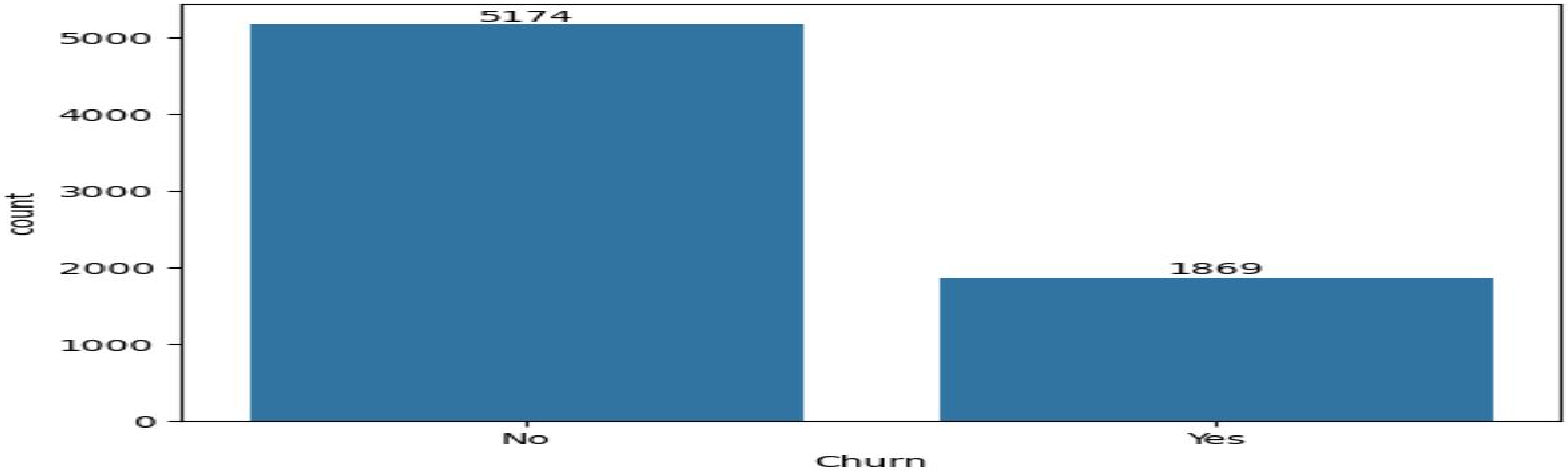
In [ ]:

With this graph, you can directly observe:

For each tenure value, how many customers churned versus stayed. Whether churn occurs more frequently for shorter tenures, longer tenures, or is evenly distributed.

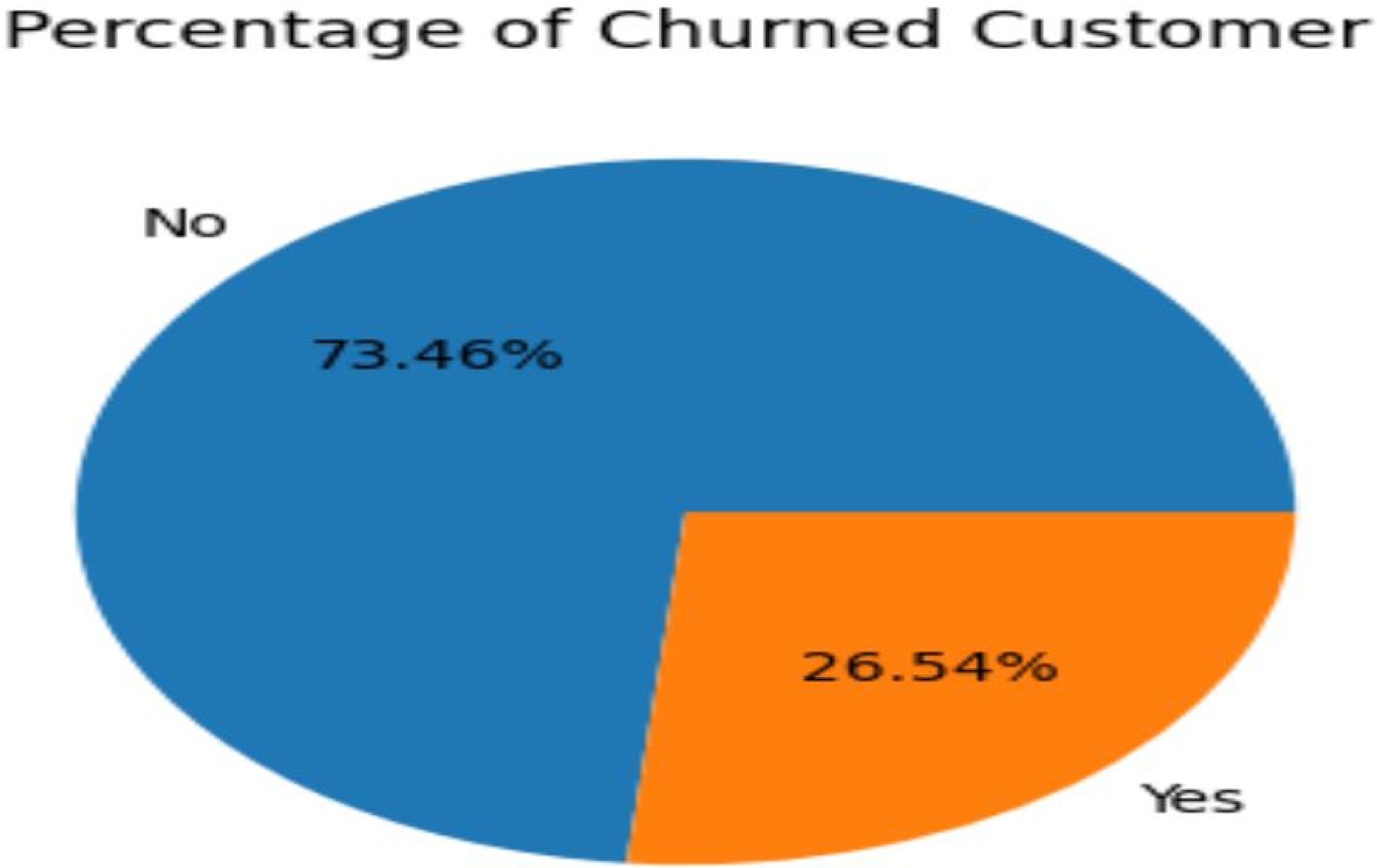
In [93]:

```
c = sns.countplot(x = 'Churn' , data =df  )for bars in c.containers:
    c.bar_label(bars)plt.show()
```



In [27]:

```
plt.figure(figsize=(4,4))gb = df.groupby("Churn").agg({'Churn' :"count"})plt.pie(gb['Churn'] ,labels =gb.index , autopct = '%1.2f%%')plt.title('Percentage of Churned Customer')plt.show()
```

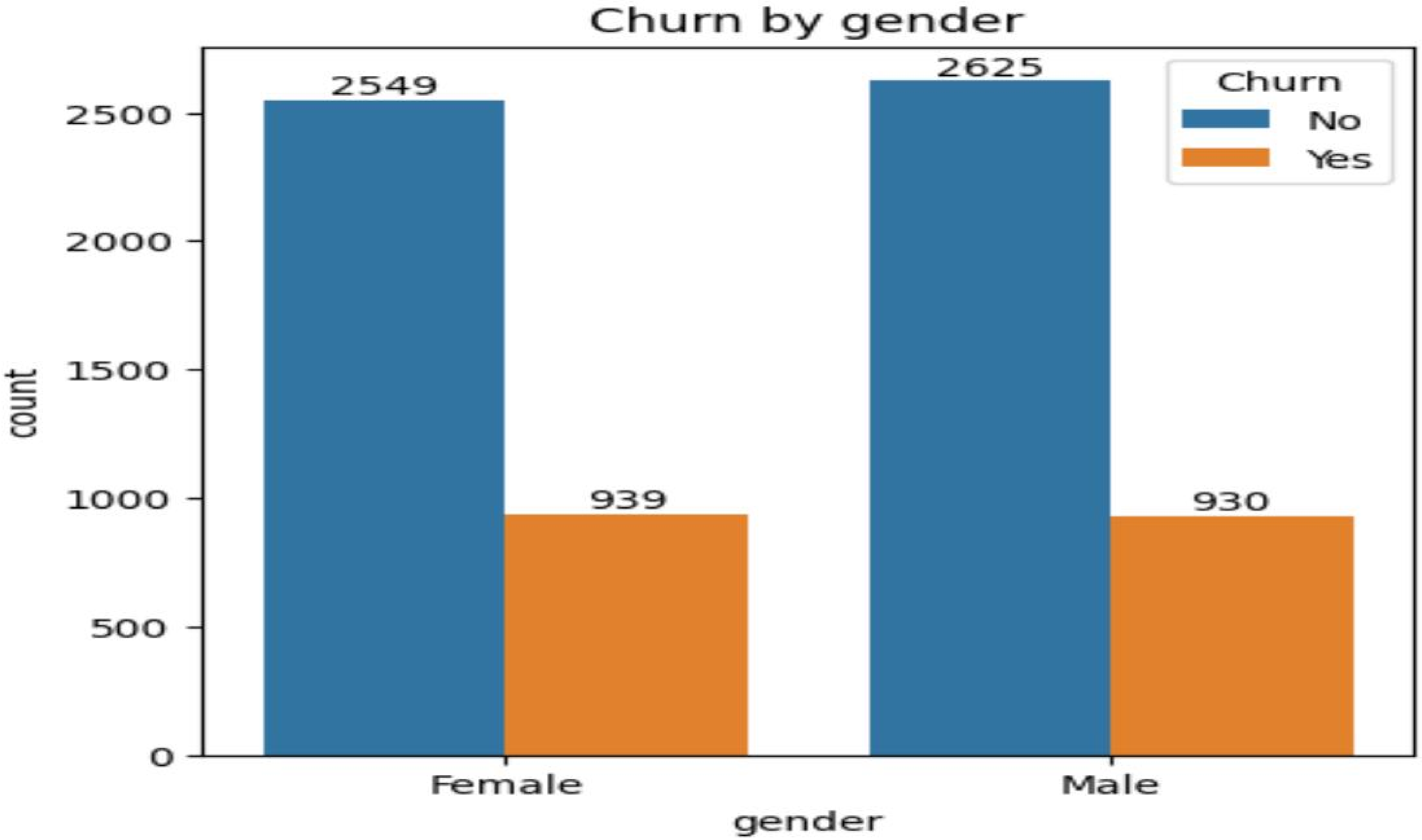


Percentage of Churned Customer

from above pie chart we can conclude 26.54 people churned out .

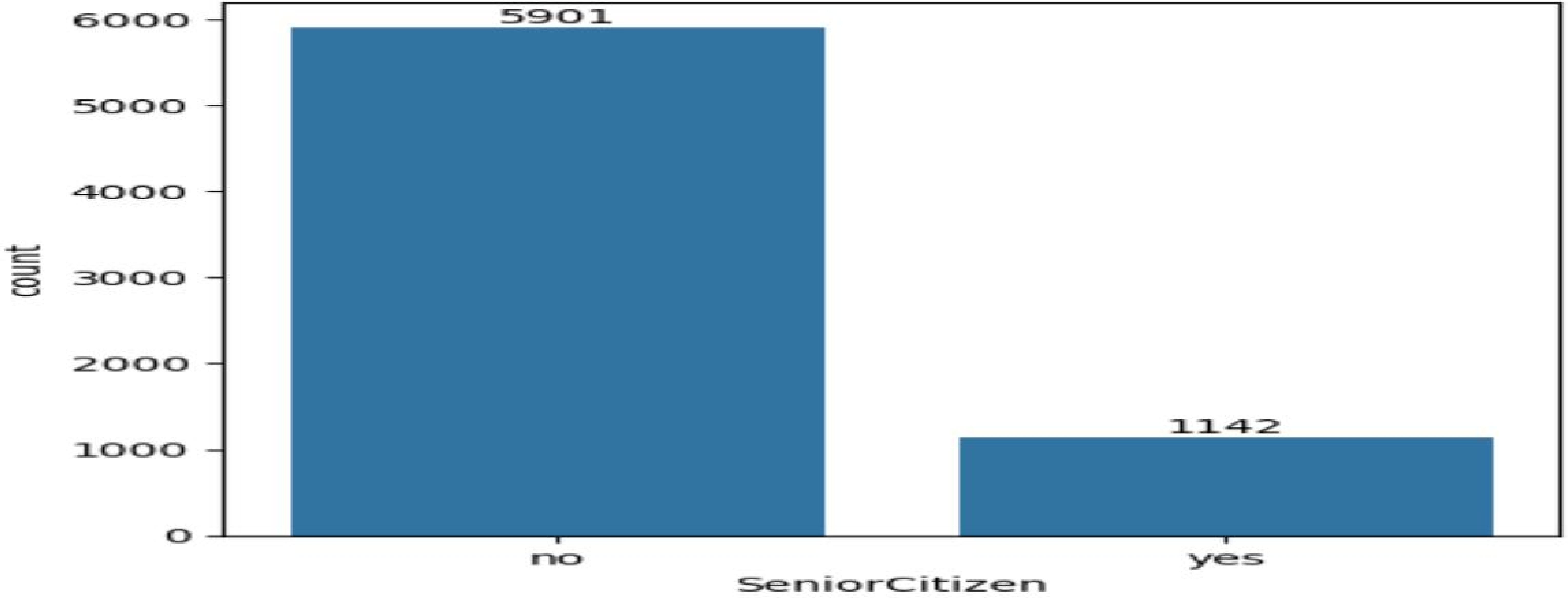
In [38]:

```
plt.figure(figsize=(5,5))g= sns.countplot(x =  'gender',data =df , hue = 'Churn')for bars in g.containers:
    g.bar_label(bars)plt.title('Churn by gender')plt.show()
```



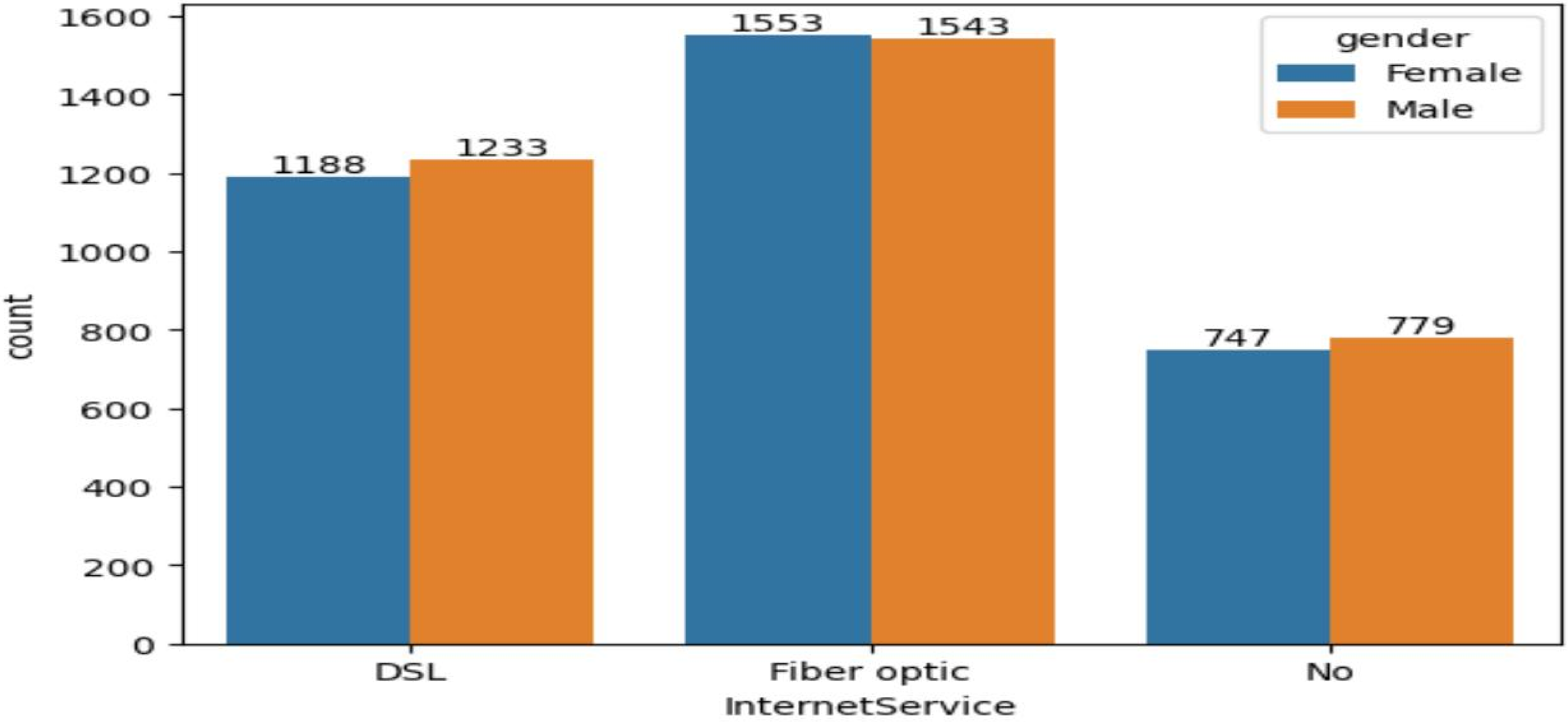
In [97]:

```
plt.figure(figsize=(5,5))g= sns.countplot(x =  'SeniorCitizen',data =df  )for bars in g.containers:
   g.bar_label(bars)plt.show()
```



In [49]:

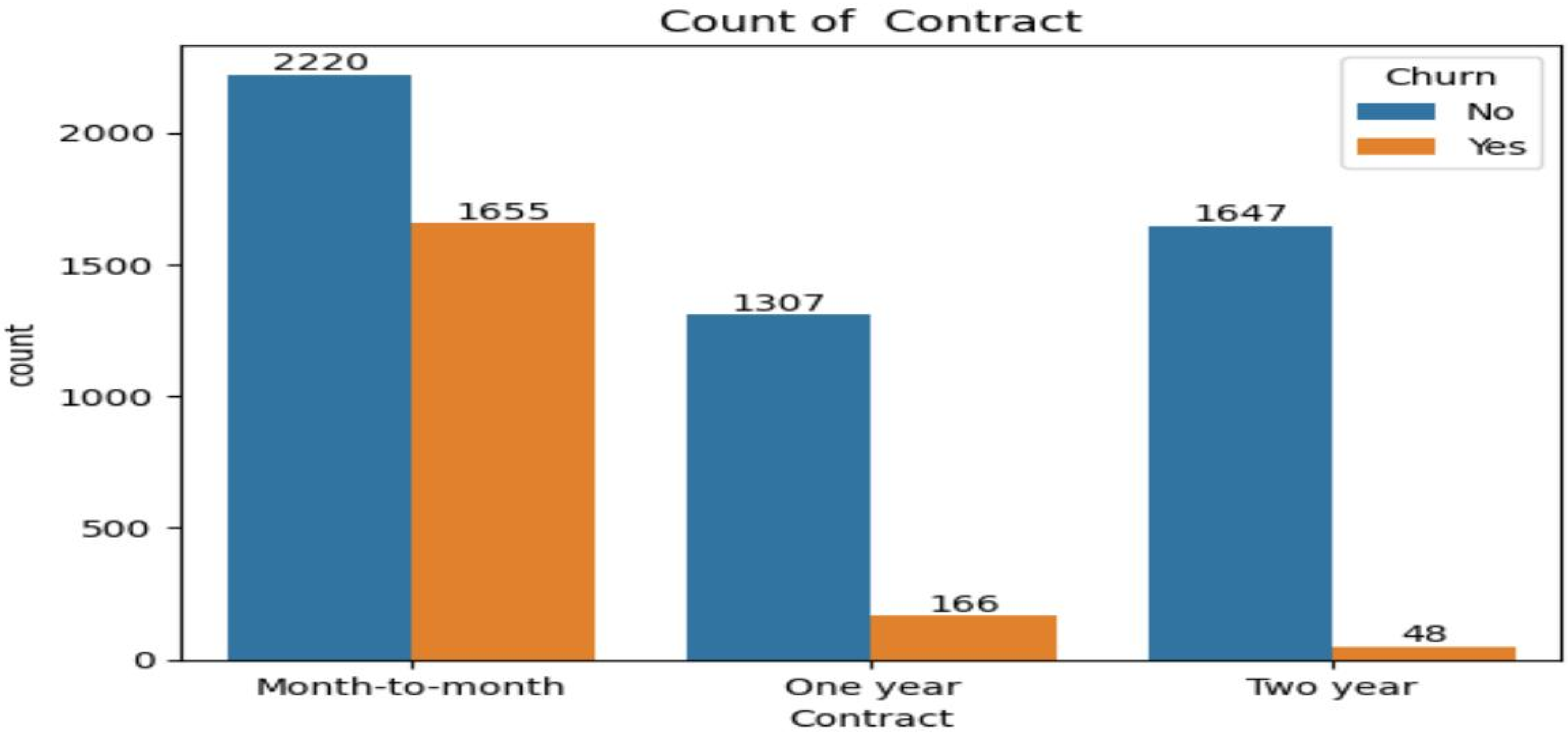
```
h = sns.countplot(x = 'InternetService' , data = df , hue = 'gender')for bars in h.containers:
    h.bar_label(bars)plt.show()
```



WIth the help of above figure we can conclude that most INTERNET SERVICE are of Fiber optic most by Female than male and male with DSL followed by female and no IS by male

In [51]:

```
c = sns.countplot(x = 'Contract',data =df , hue = 'Churn')plt.title('Count of  Contract')for bars in c.containers:
    c.bar_label(bars)plt.show()
```

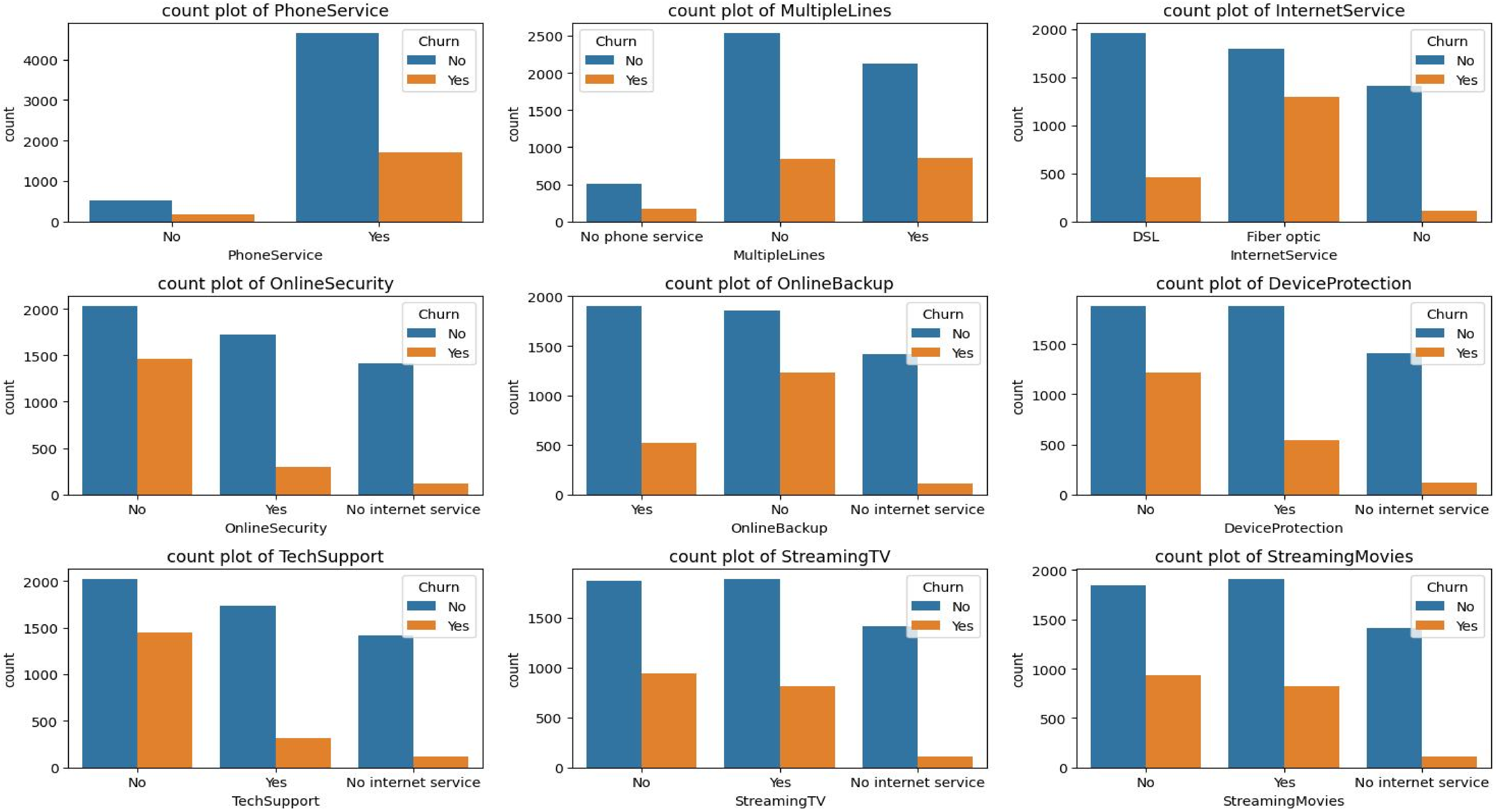


In the above graph we can clearly see total contracts of people on monthly to yearly basis mostly on month to month basis where people month to month to contract more people are churning out than that of year to two . # SO, try to make people in longer plans

In [65]:

```
columns = ['PhoneService', 'MultipleLines', 'InternetService', 'OnlineSecurity',
   'OnlineBackup', 'DeviceProtection', 'TechSupport',
   'StreamingTV', 'StreamingMovies']
# Number of subplots (3 columns per row)n_cols = 3n_rows = (len(columns) + n_cols - 1) // num_cols
fig,axes = plt.subplots(n_rows,n_cols ,figsize=(15, num_rows * 3))
axes = axes.flatten()
for i ,col in enumerate(columns):
    sns.countplot(x=col , data = df , ax= axes[i] , hue = df["Churn"])
    axes[i].set_title(f'count plot of {col}')
    axes[i].set_xlabel(col)
    axes[i].set_ylabel(f'count')

for j in range(i+1,len(axes)):
    fig.delaxes(axes[j])
# Adjust layoutplt.tight_layout()plt.show()
```

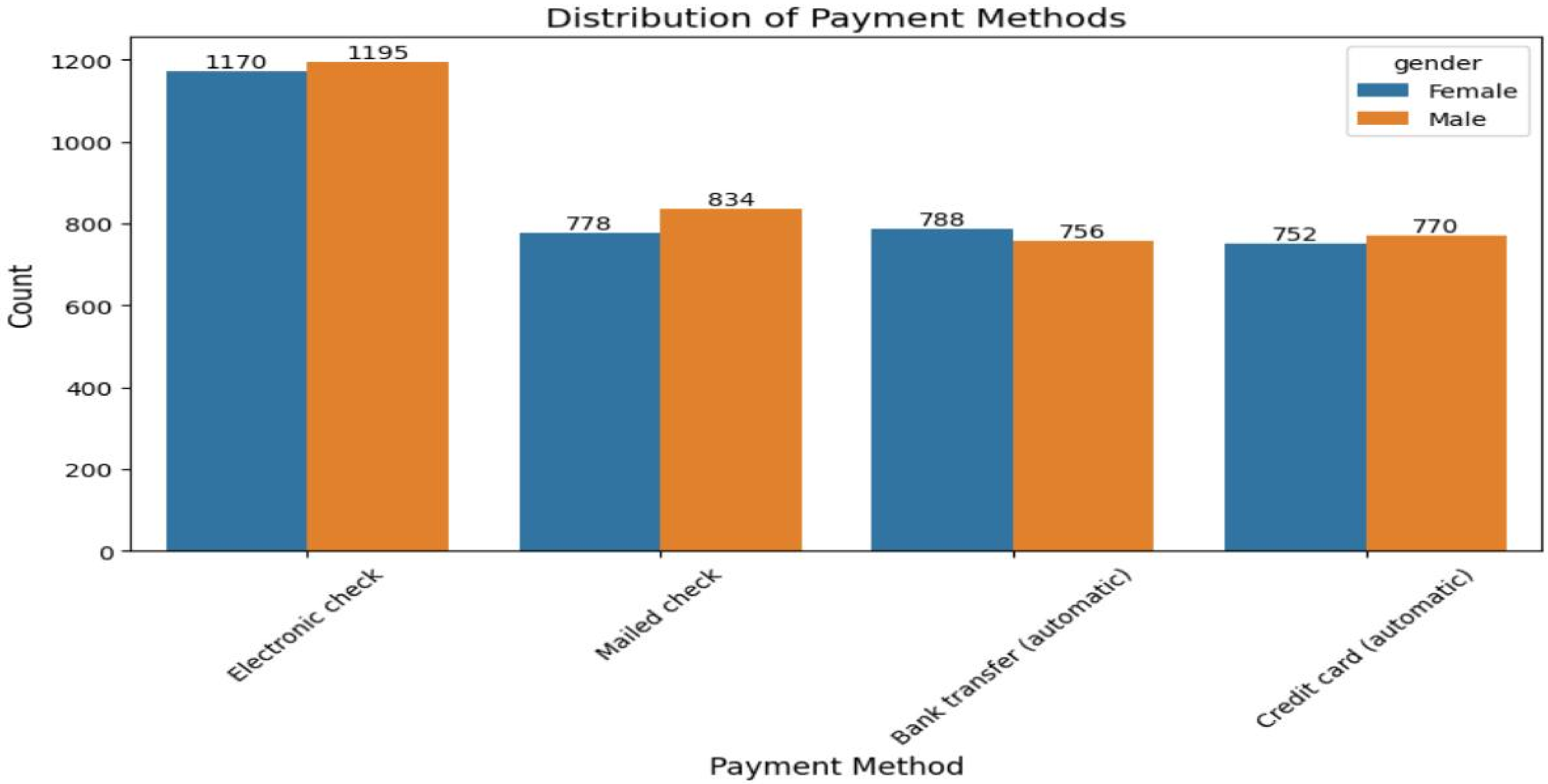


majority custorms have not churn out in DSL but for internet services , phone services with online services enabeled where as customer who churned out are online support , techsupport and streaming services

In [96]:

```
plt.figure(figsize=(10, 5))
```

```
p = sns.countplot(x='PaymentMethod', data=df , hue = 'gender')
for bar in p.containers:
    p.bar_label(bar)plt.xlabel('Payment Method', fontsize=12)plt.ylabel('Count', fontsize=12)plt.title('Distribution of Payment Methods', fontsize=14)plt.xticks(rotation=45)plt.show()
```



most of payment is done in electronic check and done by male and most payment are done by male than female

In [45]:

```
df.to_csv('new churn.csv')
```